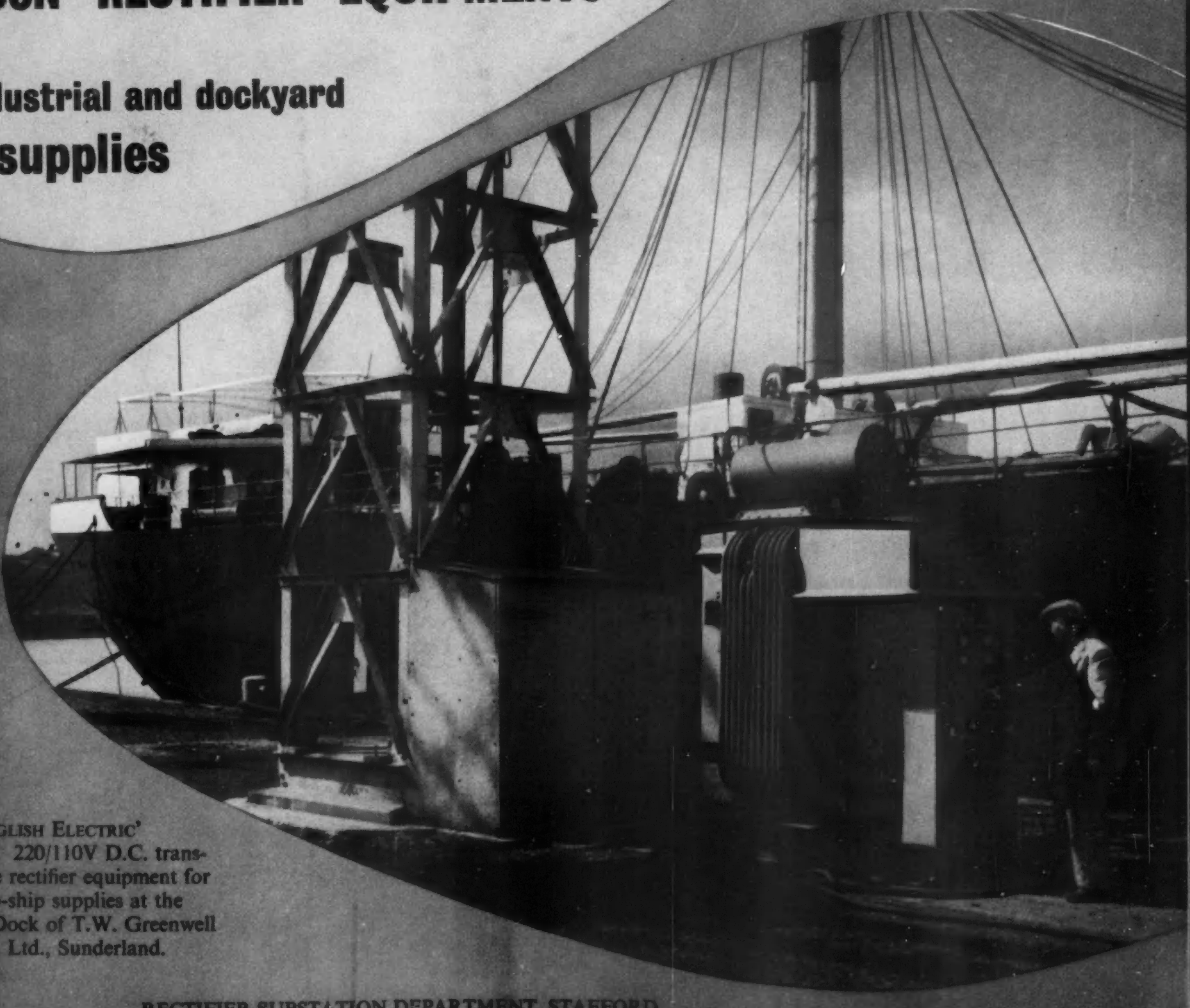
5 OCTOBER 1961

ONE SHILLING
AND SIXPENCE

ELECTRICAL TIMES



ENGLISH ELECTRIC'

SILICON RECTIFIER EQUIPMENTS
for
all industrial and dockyard
d.c. supplies

An 'English Electric' 220 kW 220/110V D.C. transportable rectifier equipment for shore-to-ship supplies at the North Dock of T.W. Greenwell and Co. Ltd., Sunderland.

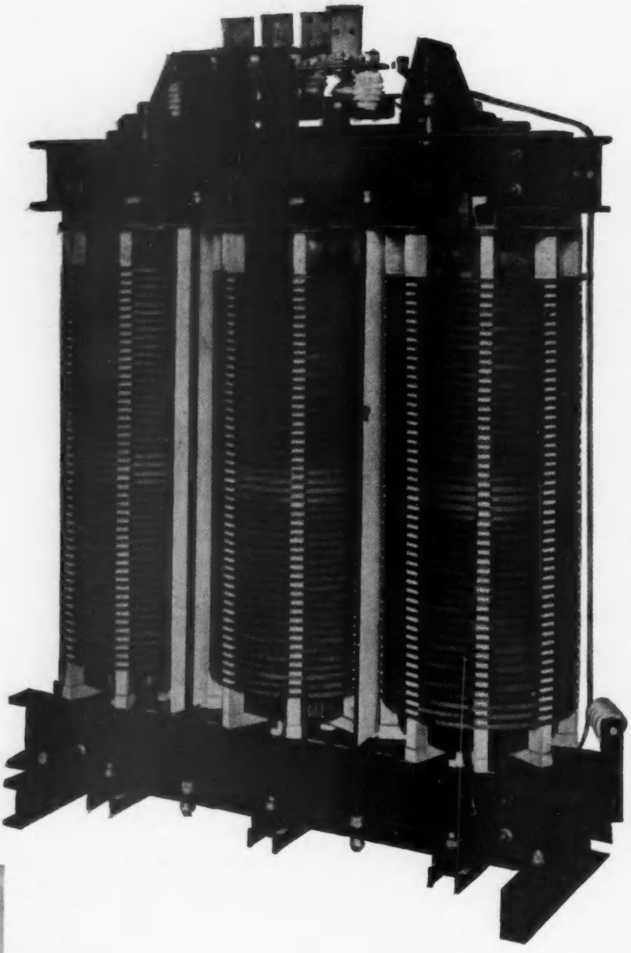
RECTIFIER SUBSTATION DEPARTMENT, STAFFORD
The English Electric Company Limited, English Electric House, Strand, London, W.C.2.

RS2

BRYCE

DRY TYPE
AIR COOLED
CLASS-C
TRANSFORMERS

SILICONE INSULATION SILICONE INSULATION SILICONE INSULATION



SILICONE INSULATION

- **No Fire Risk**
- **Reduced Weight**
- **Can be installed in damp locations**

For any installations where fire risk is high or consequential loss would be considerable, the introduction of the dry type air-cooled Class 'C' Transformer marks another major step in security.

Illustrated is a 1,000kVA, 3 phase, 50 cycles, 11,000/433 volts Bryce Low Loss Distribution Transformer using Class 'C' insulation.

BRYCE ELECTRIC CONSTRUCTION CO. LTD.

Kelvin Works, Hackbridge, Surrey. **Telephone Franklin 1101-7**

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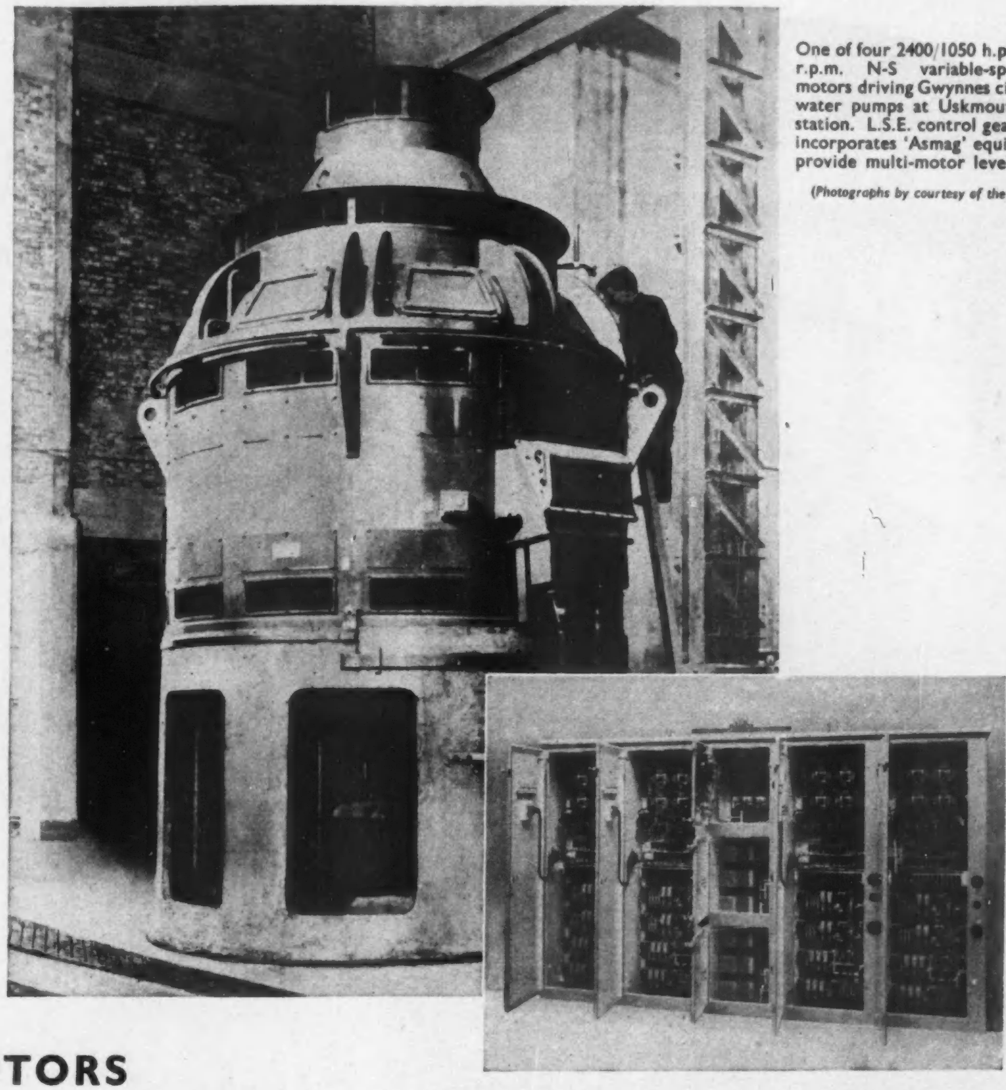

One of four 2400/1050 h.p., 450/345 r.p.m. N-S variable-speed a.c. motors driving Gwynnes circulating-water pumps at Uskmouth power station. L.S.E. control gear (below) incorporates 'Asmag' equipment to provide multi-motor level control.

(Photographs by courtesy of the C.E.G.B.)

MOTORS and CONTROL EQUIPMENT FOR PUMP DRIVES

Tens of thousands of horse-power of N-S variable-speed a.c. motors, in many instances with L.S.E. automatic control systems, are in pumping service—for water and sewage undertakings, in power stations, and for industrial applications.

Why? Because the stepless variable-speed N-S drive enables output to be regulated most efficiently, without wasteful throttling or dissipation of electrical energy, and lends itself to integration into any automatic control scheme.

Many of these motors are of considerable size, but the advantages of the N-S motor are not confined to large outputs. In numerous instances, motors of comparatively low rating (50 h.p. or less) have enabled the most economical water pumping or sewage treatment plant to be realised.

The outstanding features of the N-S variable-speed a.c. motor, especially when allied to suitable control equipment, are proving of value in almost every industry and have enabled new production techniques to be developed. If you are not fully aware of the possibilities of this machine, please ask for further details (preferably mentioning the type of application you have in mind).

LAURENCE, SCOTT & ELECTROMOTORS LTD.

Specialist Makers of Electric Motors and Control Gear since 1883 NORWICH *NOR 85A*

OUTDOOR SWITCHGEAR

FOR SEMI-HAZARDOUS AREAS

Photograph by courtesy of Shell International Petroleum Co. Ltd.

One of a large number of Motor Starter Switchboards, non-sparking, installed 15 miles off-shore on Oil Gathering Stations in Lake Maracaibo (salt water), Venezuela. These switchboards are completely weatherproof and operate under the most exacting climatic conditions conceivable.

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Subsidiary of Yorkshire Switchgear and Eng. Co. Ltd.

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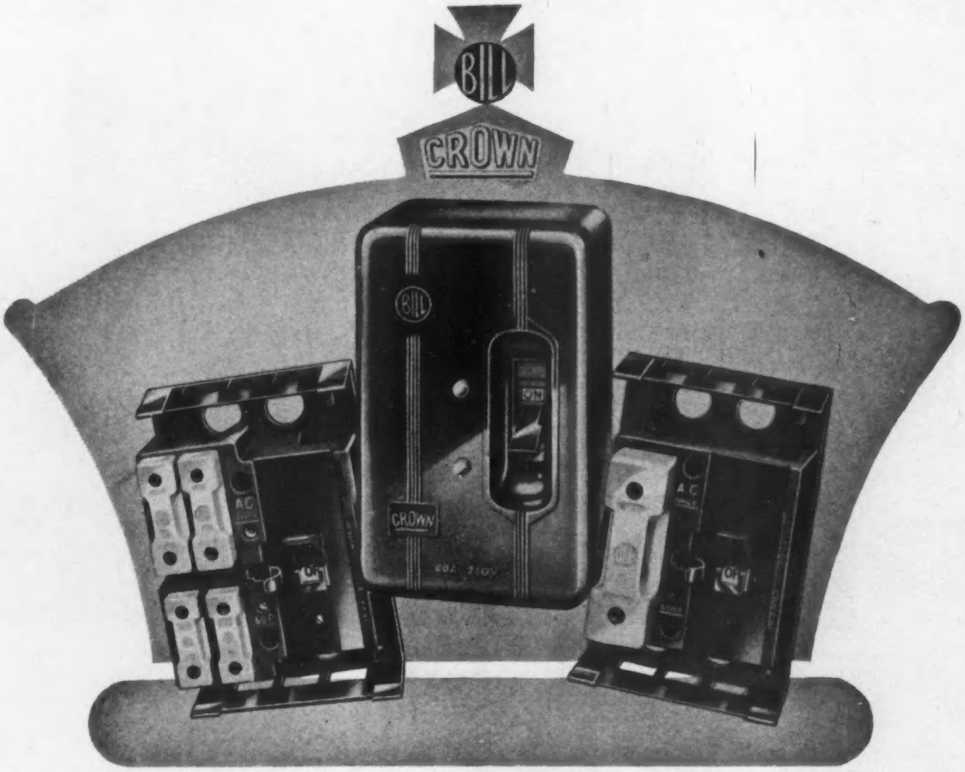

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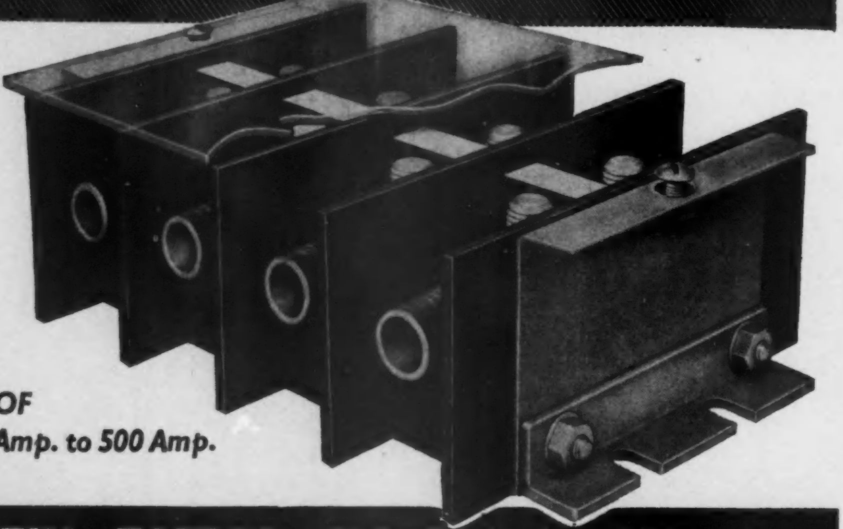
WITH SOLID OR REMOVABLE LINKS

STANDARD RANGE OF TERMINALS FROM 15 Amp. to 500 Amp.



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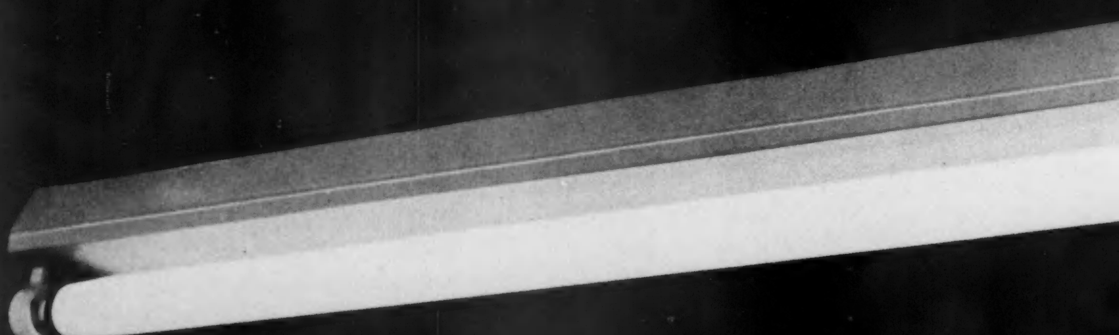

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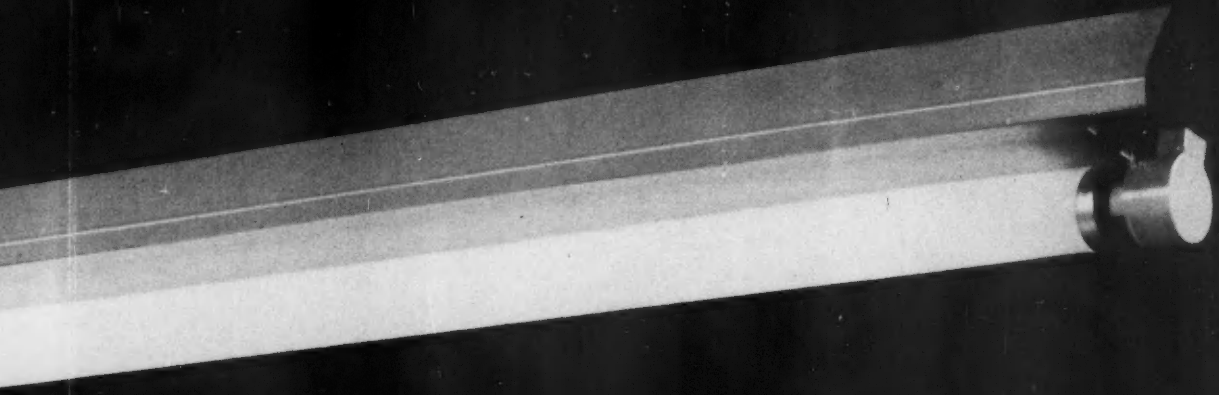

R MONEY

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S FOR 2FT. 5FT. AND 8FT. SIZES

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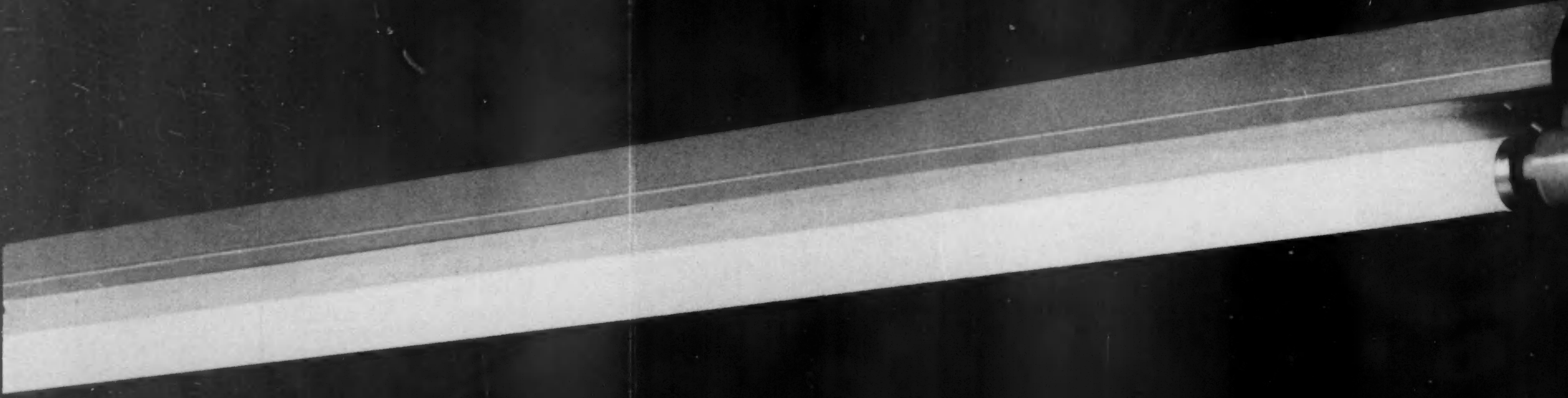

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WO LIGHT FITTINGS FOR 2FT. 5FT. AND 8FT. SIZES

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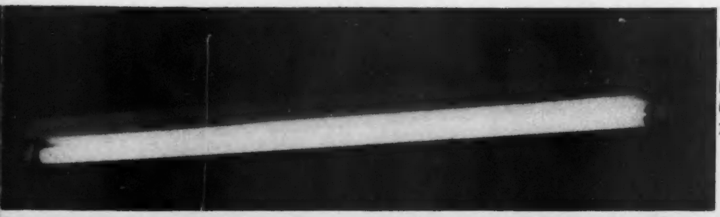
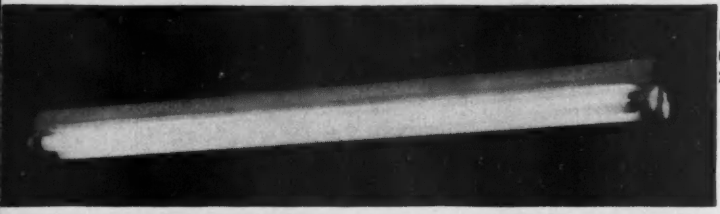
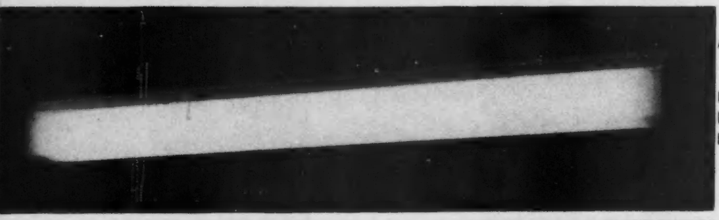
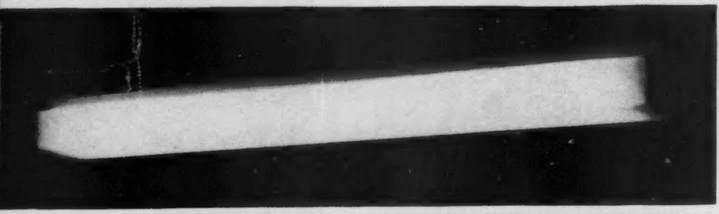
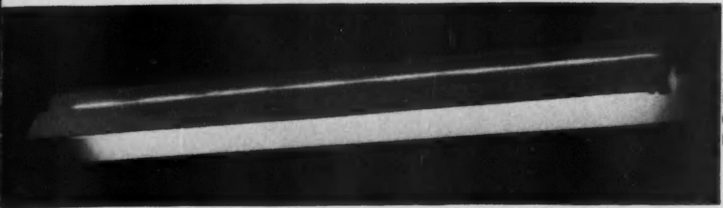
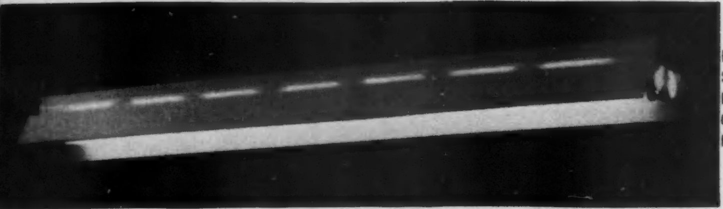
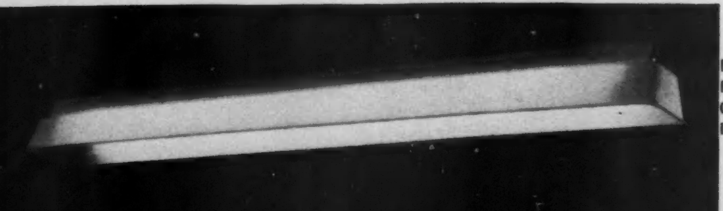
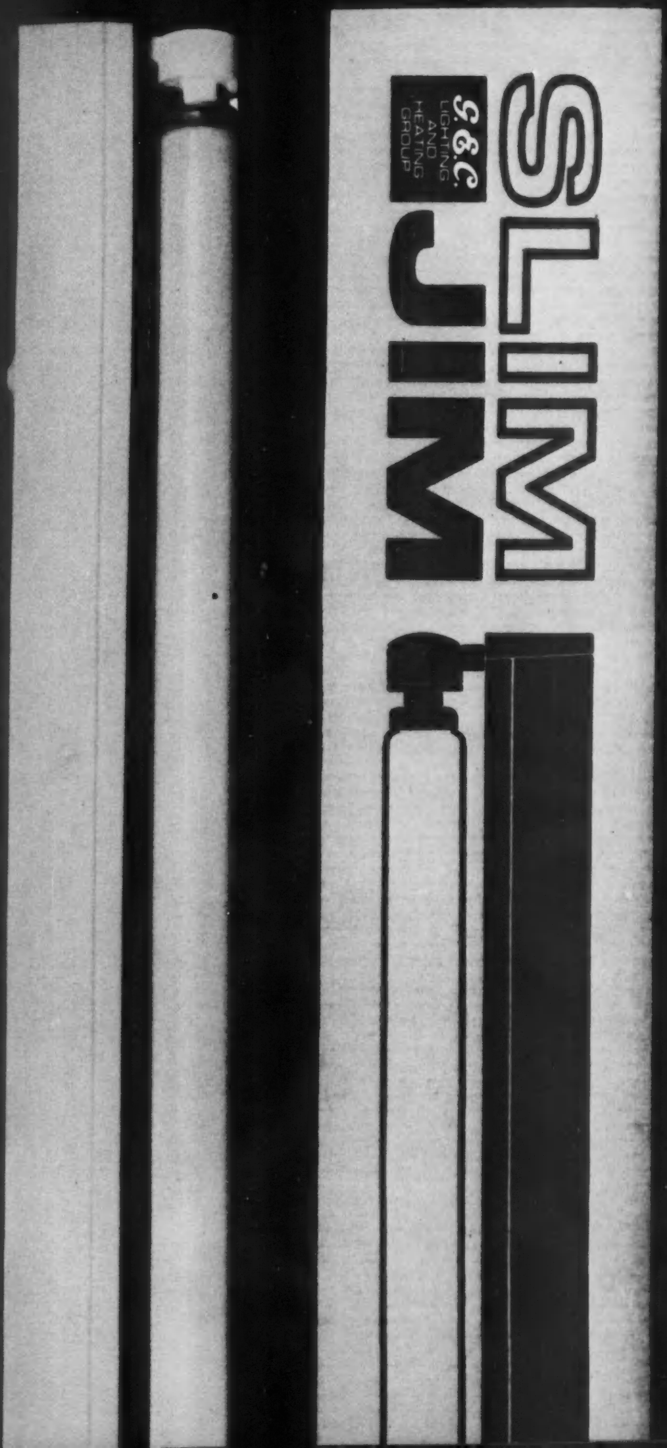
SEE THE NEW SLIM JIM FLUORESCENT FITTINGS AT YOUR NEAREST G.E.C. SHOWROOM

PRICES APPLY ONLY IN GREAT BRITAIN AND NORTHERN IRELAND

		2FT	**4**FT	**5**FT	**8**FT
	**Channels** **F.36705** **Channel** **1 light**	F.36712 20w Switch Start £3.4.3 Inc. 1/9 P.Tax & Surcharge	F.36709 40w Instant Start £4.1.10 Inc. 1/10 P.Tax & Surcharge	F.36705 80w Instant Start £4.16.6 Inc. 2/- P.Tax & Surcharge	F.36700 125w Switch Start £7.2.6
	**F.36707** **Channel** **2 light**	F.36714 2-20w Switch Start £5.3.6 Inc. 3/6 P.Tax & Surcharge		F.36707 2-80w Instant Start £9.4.0 Inc. 4/- P.Tax & Surcharge	F.36702 2-125w Switch Start £12.10.0
	**Attachments** **F.41191** **Diakon** **Diffusers**	F.41184 20w £1.7.7 Inc. 4/7 P.Tax & Surcharge	F.41195 40w £1.19.7 Inc. 6/7 P.Tax & Surcharge	F.41191 80w £2.2.0 Inc. 7/- P.Tax & Surcharge	F.41186 125w £3.9.8 Inc. 11/8 P.Tax & Surcharge
	**F.41193** **Diakon** **Diffusers**	F.41198 2-20w £1.16.0 Inc. 6/- P.Tax & Surcharge		F.41193 2-80w £3.3.1 Inc. 10/7 P.Tax & Surcharge	F.41188 2-125w £5.2.2 Inc. 17/2 P.Tax & Surcharge
	**F.62381** **Stove** **Enamel** **Open-ended** **Reflectors**			F.62381 80w £1.3.0	F.62370 125w £2.5.0
	**F.62383** **Stove** **Enamel** **Open-ended** **Reflectors**			F.62383 2-80w £1.3.0	F.62372 2-125w £2.5.0
	**F.62385** **Perspex** **Closed-end** **Reflectors**			F.62385 80w £3.0.0	

[illegible] PACK COMPLETE WITH
[illegible] WARM WHITE TUBE ALREADY
FOR INSTALLATION FOR ONLY
[illegible] INCLUDING 2/- PURCHASE TAX
AND SURCHARGE
THE FINEST VALUE IN
FLUORESCENT LIGHTING



SLIM JIM
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LIGHTING AND HEATING GROUP

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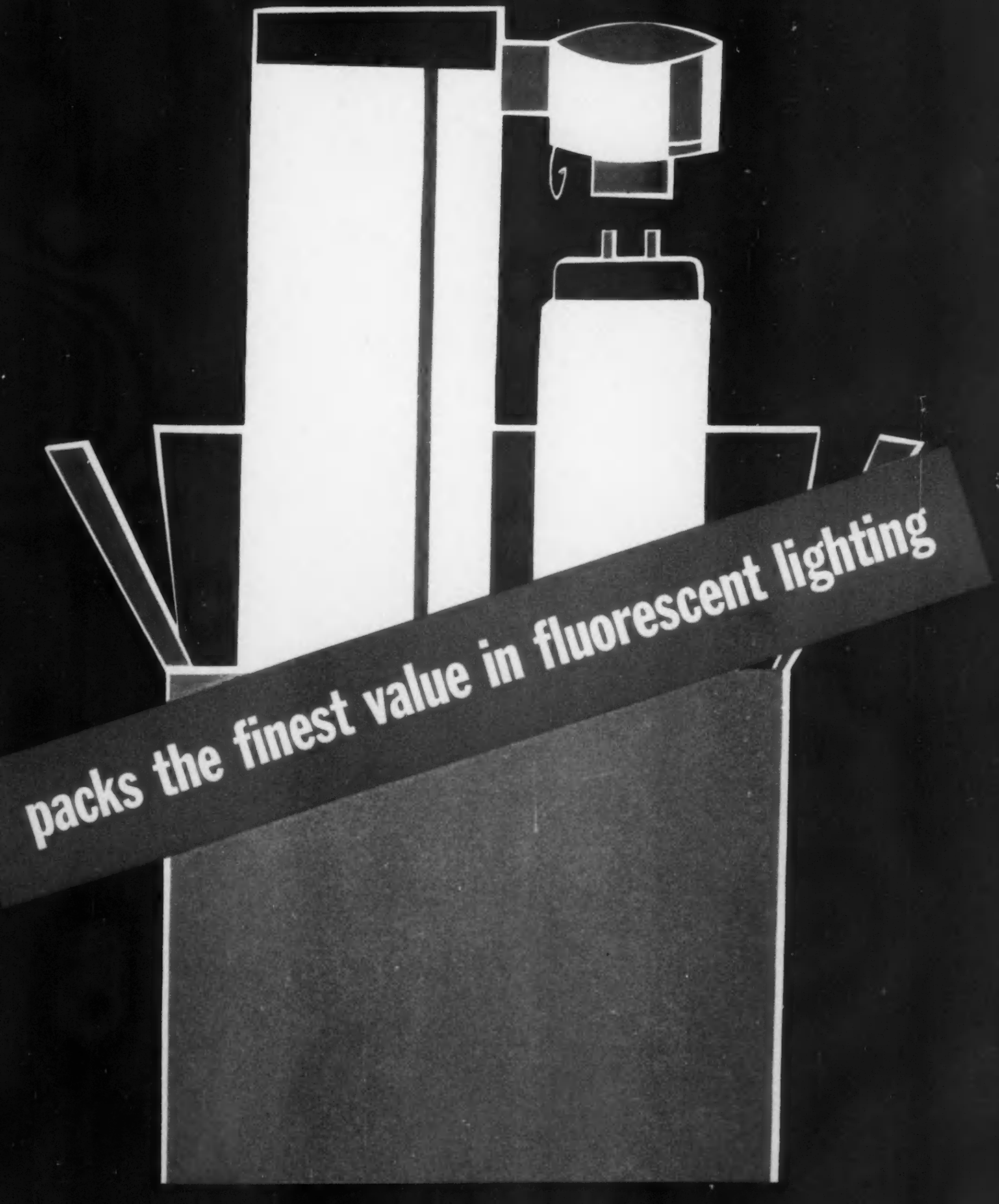
packs the finest value in fluorescent lighting

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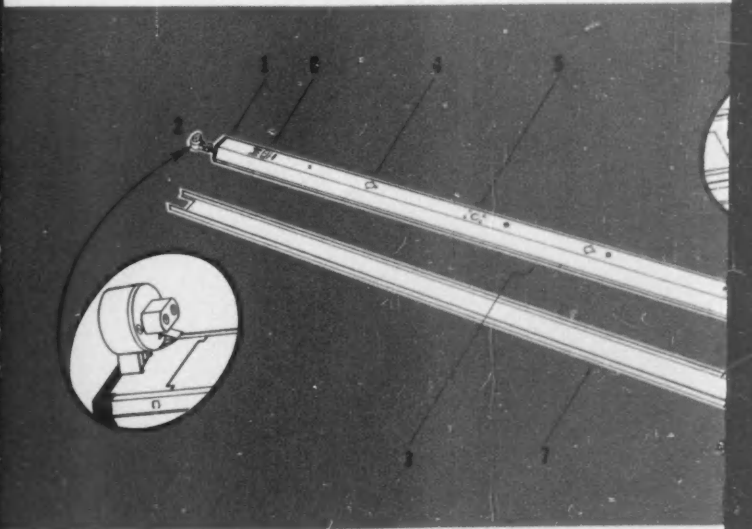
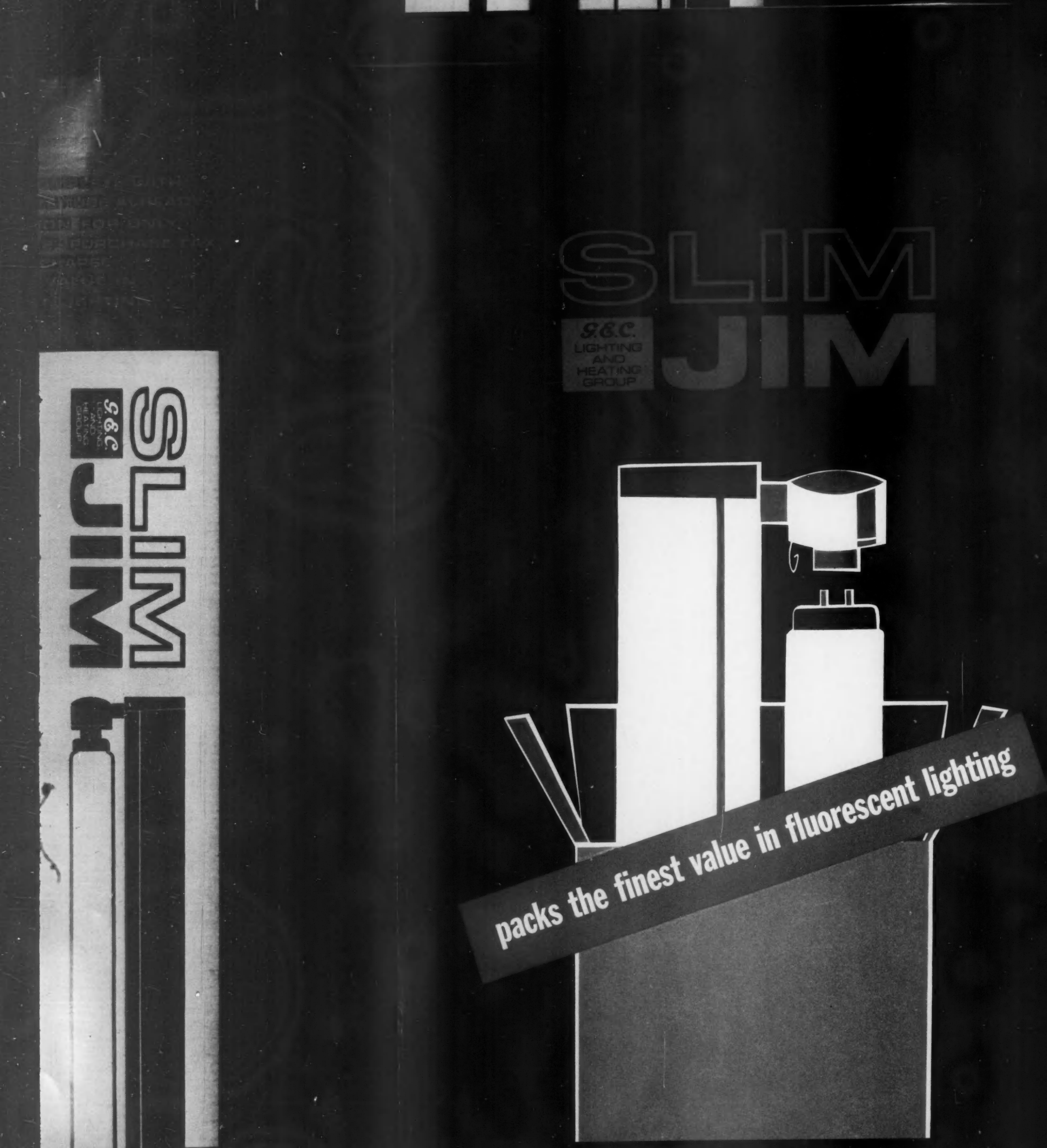
'Slim Jim' comes complete in
All reflectors and attachments can be fi
the simplest movement: no lo
Easily handled by one person—ev
Holders of entirely new design making tub
single handed job. Retractable at *both*
contact pressure. Channel cover fixes wit
and automatically earths when
Ingenious catch snap fits reflectors by simpl
Good looking, well designed attachme

Patents applied for



THE LIGHTING AND HEATING
THE GENERAL ELECTRIC COMP
MAGNET HOUSE, KINGSWAY, LON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G.E.C.
LIGHTING AND HEATING GROUP
SLIM JIM
packs the finest value in fluorescent lighting

SLIM JIM

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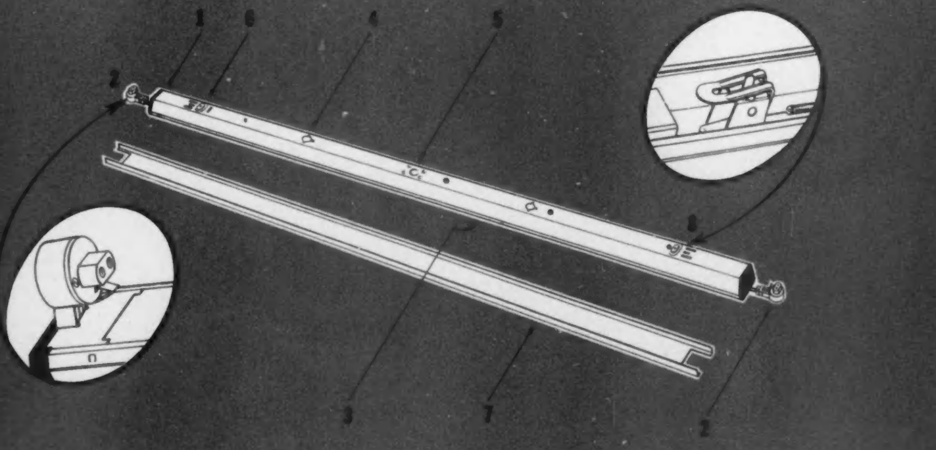
'Slim Jim' comes complete in one pack.
All reflectors and attachments can be fixed or removed by
the simplest movement: no loose parts.
Easily handled by one person—even the 8′ size!
Holders of entirely new design making tube replacement an easy
single handed job. Retractable at *both* ends, with positive
contact pressure. Channel cover fixes without screws or catches
and automatically earths when in position.
Ingenious catch snap fits reflectors by simply pushing up into spine.
Good looking, well designed attachments and diffusers.

Patents applied for



1 Black spring-loaded metal end caps
2 Retractable holders at both ends
3 Ample cable cleats for neat wiring
4 Keyhole fixings assist direct ceiling mounting
5 Masking plate supplied for central conduit box
6 Holes for conduit suspension
7 Cover plate
8 Reflector catch

THE LIGHTING AND HEATING GROUP
THE GENERAL ELECTRIC COMPANY LTD
MAGNET HOUSE, KINGSWAY, LONDON, WC2

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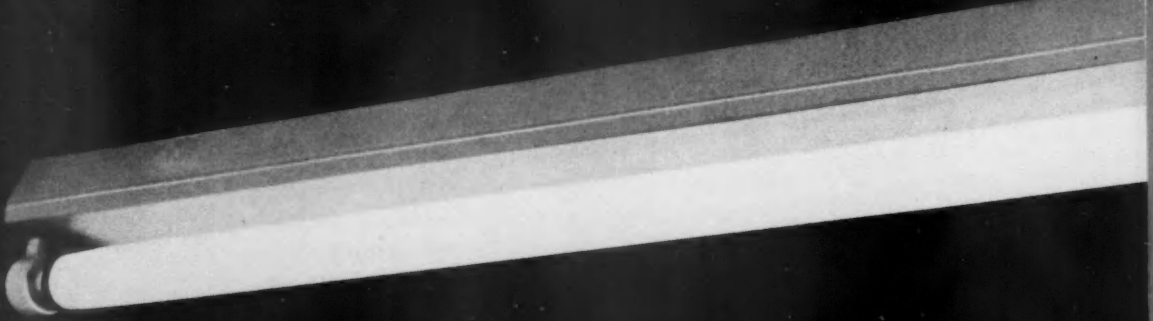

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Millions of miles of Spencer Wire has been manufactured for the electrical trade for over 50 years.

The most up-to-date equipment is installed to maintain the Spencer reputation for reliable quality and service.

BARE COPPER STRIP
for transformer winding, etc.

BARE COPPER STRAND
for overhead power transmission

BARE COPPER AND TINNED WIRE
for all electrical purposes

SUPER GRADE BARE COPPER WIRE
for enamelling and covering

Materials in coils and drums to customers' requirements, very promptly delivered

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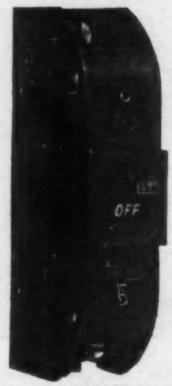
DO YOU KNOW.... *that* **LUPUS M.C.B. DISTRIBUTION BOARDS ARE USED THROUGHOUT THE NEW "GUY'S HOUSE" SURGICAL BLOCK?**

M. C. B.



Single pole "MIDGET" M.C.B.

- ★ Double plug-in feature available
- ★ Full range of Distribution Boards
- ★ Single, Double or Triple Pole
- ★ Simple installation
- ★ Ex-Stock Delivery

Continuity of Supply always ensured with . . .

Registered Lupus Trade Mark

Miniature Circuit-Breakers

Pre-tested and guaranteed ★ Used the World over

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FLATS FACTORIES
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The M.C.B. Co. (Manchester) Limited

Specialists in Miniature Circuit-Breakers

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Telephone: Altrincham 2722/3

Medium-size a.c. motors

FROM STOCK

IMMEDIATE DELIVERY

is offered of all the following foot-mounted induction motors. The ratings listed are for 400/440 volt, 3-phase, 50-cycle supplies.

SQUIRREL CAGE (BS 2613)

Screen-protected		Totally enclosed fan-cooled	
h.p.	*speed r.p.m.*	*h.p.*	*speed r.p.m.*
30	970	25	730
30	725	50	730
50	725	†65	1475
*55	720	†65	975
70	720	†80	1465
*75	970	†85	950
100	1455	100	1480
100	725	†100	1450
*125	1465	†125	980
*130	970		

SLIPRING (BS 2613)

Screen-protected	
h.p.	*speed r.p.m.*
30	965
50	1450

**drip-proof enclosure*

† totally-enclosed closed air circuit motors, radiator cooled.

For further details of these and other AEI stock motor ranges, please contact your local AEI district office or Industrial Machines Dept., Mosley Road Works, Trafford Park, Manchester 17. Telephone No. Trafford Park 2431. Extension 1212.

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A5573

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MAGNETIC
SWITCHES
The Mobrey
General Purpose
Level Switch

RONALD TRIST
& CO. LTD.
(*a company of the Bell's Asbestos and Engineering Group*)
Bath Road, Slough, Bucks
Telephone: 25041 *Telegrams:* Resvalar, Slough

For indicating or controlling liquid level in tanks and similar vessels.
Employed as a high- or low-level alarm its contacts are wired in conjunction with an indicating lamp or some audible warning device.
Used for controlling an electrically driven pump supplying liquid to or extracting liquid from a vessel, its contacts are wired in conjunction with the contactor coil in the pump motor starter.
There are over 100 different types of switch available for use in almost any liquid.

Please ask for Brochure ET.M.160.

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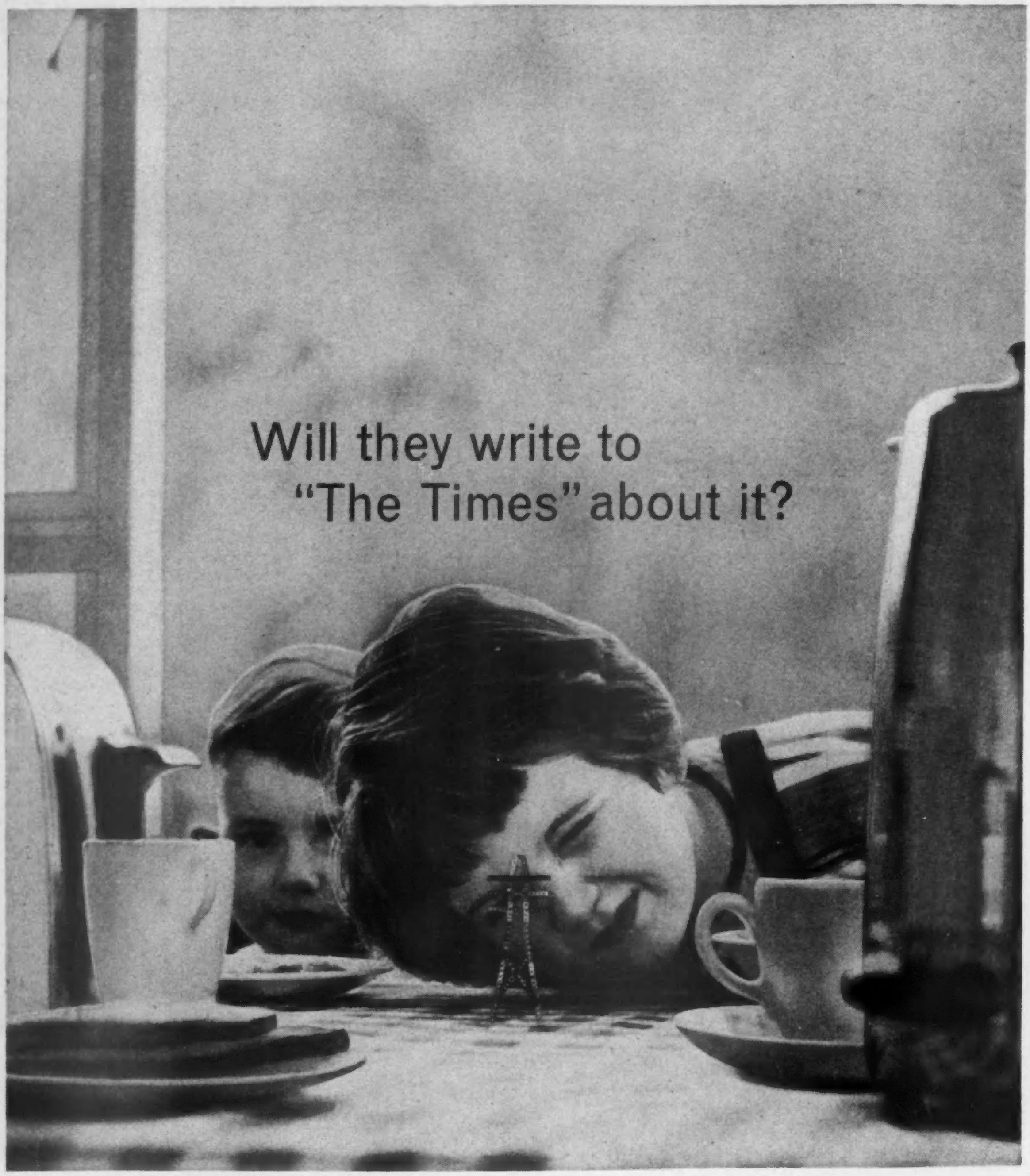


By the time these children are ten years older, Britain's power demands will have doubled. But the number of transmission towers will *not* have doubled. On the contrary—because the Central Electricity Generating Board is adopting 400,000 volt transmission, fewer new towers will be needed. The new power system will use some existing towers, suitably reinforced, and a limited number of new, slightly taller ones. By Act of Parliament, the C.E.G.B. must provide an efficient, economical electricity supply, while preserving visual amenity as far as possible.

■ **These advertisements are appearing in the farming and country magazines. The Central Electricity Generating Board thank electrical contractors for their co-operation in the past, and know that they will do all they can to preserve the amenities of the countryside.**

C E G B **who make and supply electricity to 12 Area Electricity Boards in England and Wales (which re-sell to consumers) and British Railways.**

Write for a copy of "Preserving Amenities" to
The Central Electricity Generating Board, 76, Winsley Street, London, W.1

NEWS SHEET

First 1,000 MW set ordered by New York supply company. Allis-Chalmers to build machine as cross-compound 2,400 lb/sq in., 1,000°F reheat five-cylinder set, running at 3,600 r.p.m., h.p./i.p. shaft, 1,800 r.p.m., l.p. shaft. 1966 commissioning. (501)

Water companies may be asked to warn of change from metal pipes, to give electrical engineers chance to change to other earthing methods. Official move seems imminent. (477)

APLE conference opens at Scarborough. President puts pedestrians' case for better colour rendering in street lighting. H. Hewitt surveys public lighting costs for different light sources in four broad categories. (478, 495)

14% increase in electrical engineering output in June, shown by BoT index. Electrical and mechanical engineering orders from overseas show unprecedented rise in July. Home orders for combined industries 12% higher than a year ago. (503)

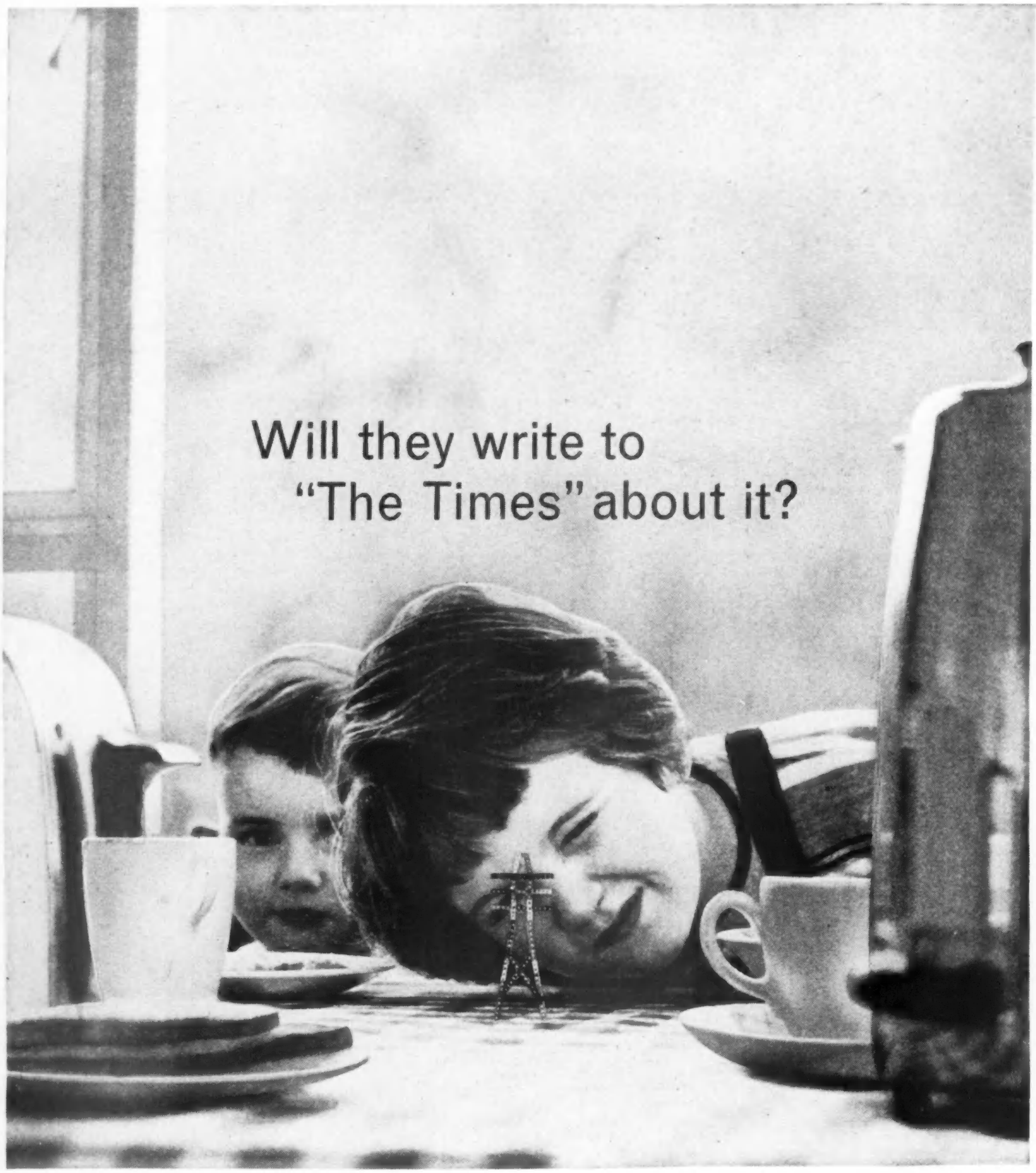
Conference on heating and ventilating hears ten-year forecasts. Growth of air conditioning in UK and Europe foreseen with electricity as fuel of future in UK. Thermoelectric heating/cooling devices considered most promising recent development. (478, 480)

Excessive sensitivity may be danger with some current-balance e.l.c.b's, warns J. A. Robbins, advocating ½ amp or 1 amp differential operating current for 30 amp breakers. (483)

10,000 lumens/100 linear ft is three-year target for main roads in final report of London's consultative committee on street lighting. Recommendations also include more uniform lighting for trunk roads and changes in scheduled lighting-up times. (490)

Future financing of supply industry to require 55% self-financing, forecasts Electricity Council. Revised estimates show capital requirements £1,472 million in four years, 1961-65. Area board self-financing. (488)

PEOPLE—J. Panton to be S. Wales EB asst. chief engineer (meters) . . . F. French becomes director and general manager, Edmundsons Electrical Wholesalers . . . M. H. Barnes joins Denham and Morley as heating div. manager . . . In S. Western Region, CEGB, R. C. Barrett becomes deputy regional secretary, and G. O. James personnel officer . . . W. L. Bentley succeeds H. L. Jones (retiring) as Spalding district com. engineer, East Midlands EB . . . Sir Willis Jackson appointed to Advisory Council on Scientific Policy . . . J. W. Warner becomes director Alkaline Batteries . . . W. H. Rigg leaves Revo to join Firth Cleveland Tools as managing director . . . G. F. Slade promoted to deputy chief engineer, MEB. (492, 494)



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14% increase in electrical engineering output in June, shown by BoT index. Electrical and mechanical engineering orders from overseas show unprecedented rise in July. Home orders for combined industries 12% higher than a year ago. (503)

Conference on heating and ventilating hears ten-year forecasts. Growth of air conditioning in UK and Europe foreseen with electricity as fuel of future in UK. Thermoelectric heating/cooling devices considered most promising recent development. (478, 480)

Excessive sensitivity may be danger with some current-balance e.l.c.b's, warns J. A. Robbins, advocating ½ amp or 1 amp differential operating current for 30 amp breakers. (483)

10,000 lumens/100 linear ft is three-year target for main roads in final report of London's consultative committee on street lighting. Recommendations also include more uniform lighting for trunk roads and changes in scheduled lighting-up times. (490)

Future financing of supply industry to require 55% self-financing, forecasts Electricity Council. Revised estimates show capital requirements £1,472 million in four years, 1961-65. Area board self-financing. (488)

PEOPLE—J. Panton to be S. Wales EB asst. chief engineer (meters) . . . F. French becomes director and general manager, Edmundsons Electrical Wholesalers . . . M. H. Barnes joins Denham and Morley as heating div. manager . . . In S. Western Region, CEGB, R. C. Barrett becomes deputy regional secretary, and G. O. James personnel officer . . . W. L. Bentley succeeds H. L. Jones (retiring) as Spalding district com. engineer, East Midlands EB . . . Sir Willis Jackson appointed to Advisory Council on Scientific Policy . . . J. W. Warner becomes director Alkaline Batteries . . . W. H. Rigg leaves Revo to join Firth Cleveland Tools as managing director . . . G. F. Slade promoted to deputy chief engineer, MEB. (492, 494)

NEWS SHEET

More emphasis on teaching fundamentals advocated at conference on teaching electrical machine theory. Generalised machine installed at Queen Mary College has steady-state and transient performance similar to both a.c. and d.c. conventional machines. (479)

EAW survey of domestic electrical requirements and equipment provides pointers for manufacturers. General satisfaction with present appliances. (482)

Research by area boards concentrates on plastics cables, current loading. Annual reports show 1960-61 relatively undisturbed operationally. Tests suggest domestic consumer ADMD on-peak is proportional to annual energy purchase. Storage heating booms. (485)

Most board costs per unit fall over ten-year period to 1961, differences shown in histograms. Revenue from assets increases. (478, 487)

W. Germany emerges as leading electrical exporter, shows BoT survey. US slips to second place and UK becomes third. Japan rockets from nil to 7½% of world market in seven years. (502)

Midland EB developing low-cost room air-conditioner, with accent on good appearance, quietness of operation. (478)

More use of exhibitions by British manufacturers; admission of foreign goods to British exhibitions called for by Sir William McFadzean at Electrical Engineers' Dinner. (477, 482)

Effectiveness and activity of electricity consultative councils discussed in BSI *Shoppers' Guide*. No clear-cut conclusions offered. (503)

First real upturn in refrigerator deliveries in July; 10.3% more leave factories than last year, but exports continue to decline. (501)

BUSINESS—Plessey sell potentiometer know-how to US (502) . . . Phoenix Electrical takeover approved . . . Metal Industries' new arrangements in Canada (501) . . . EMI shows little benefit from acquisition of Morphy-Richards with total earnings only £100,000 higher, dividend stays at 17½% . . . Steady dividends also from Drayton Controls and Cambridge Instruments . . . Plessey pay 17% but expect lower profits, and KG (Holdings) dividend 3% up . . . Pifco and Electrical Components report higher sales . . . recovery expected by Bruce Peebles and Belmos . . . H. J. Baldwin again pass pref. dividend. (506)

OVERSEAS—English Electric's South Cairo power plant order confirmed . . . Canadian General Electric offer to acquire Dominion Engineering Works . . . Tasmania set up Board of Inquiry on Fingal Valley power plans . . . Plant ordered for Europe's 242 MW Chooz nuclear station . . . Peace *v.* Columbia squabble continues in Canada. (507)

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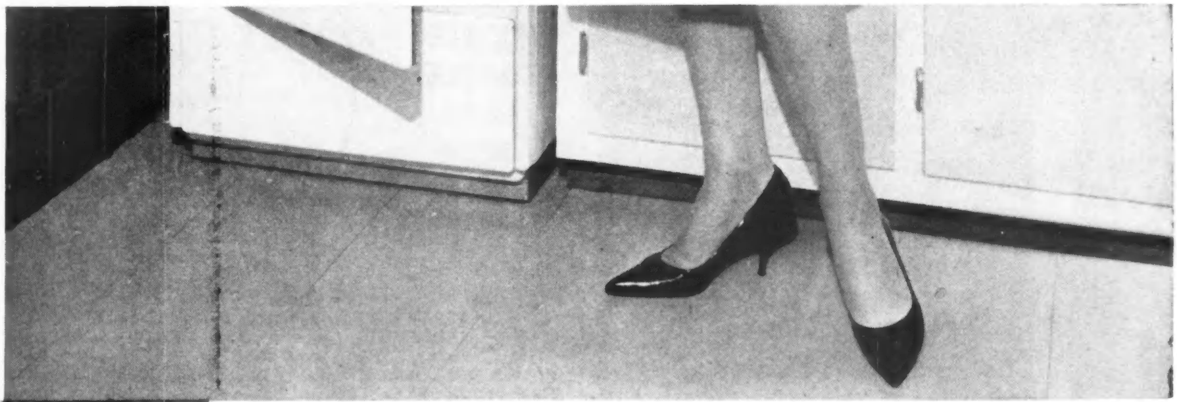

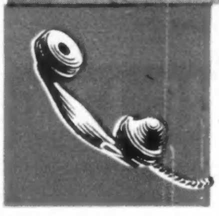

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NEWS SHEET

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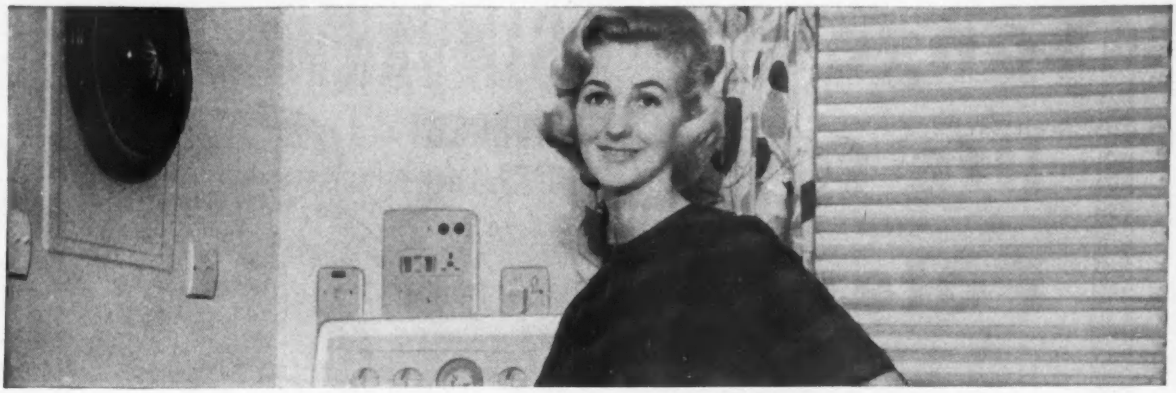

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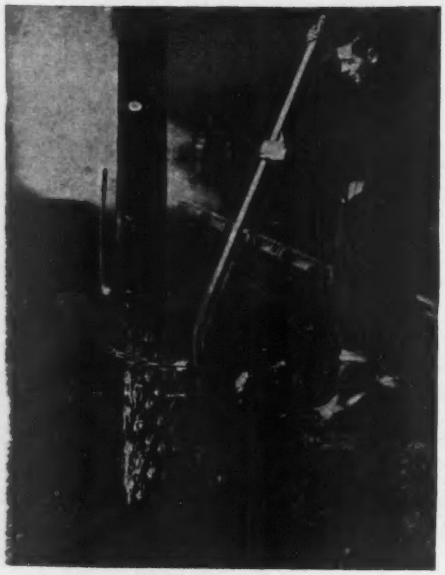

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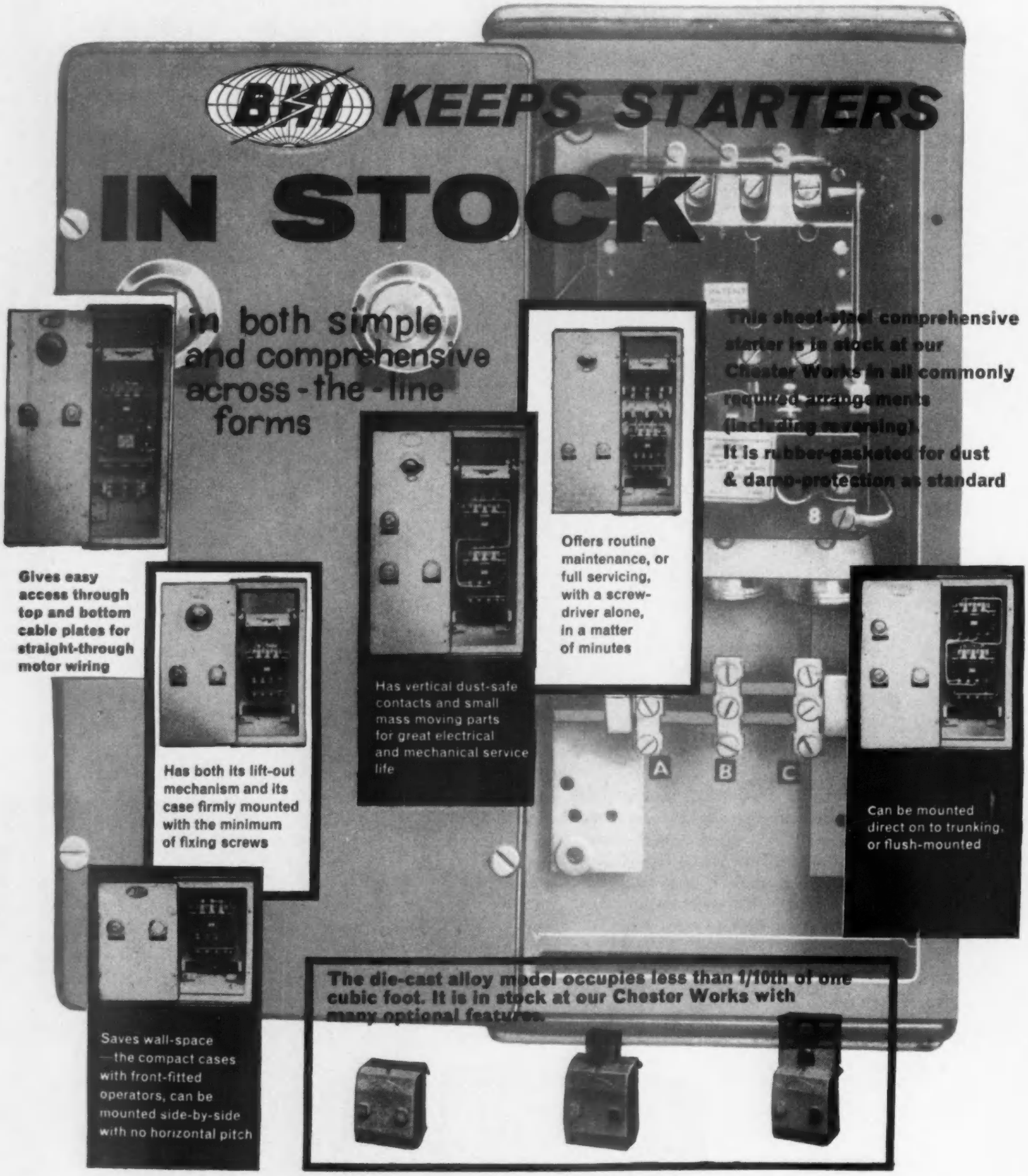

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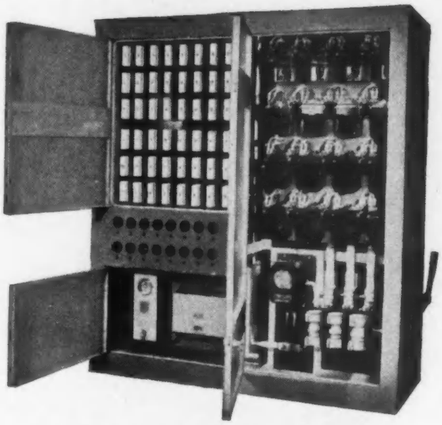

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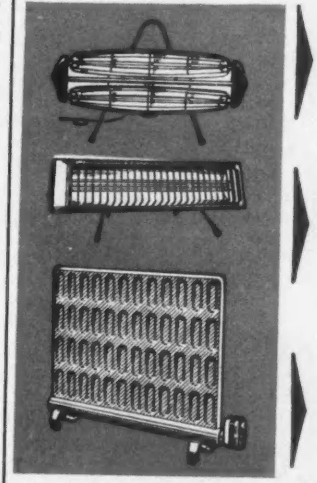

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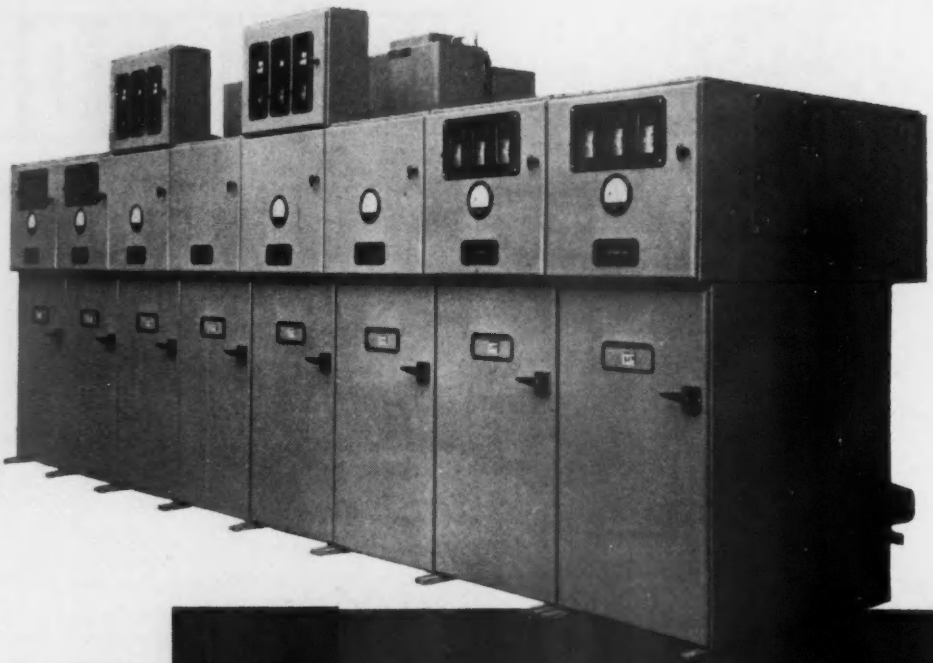
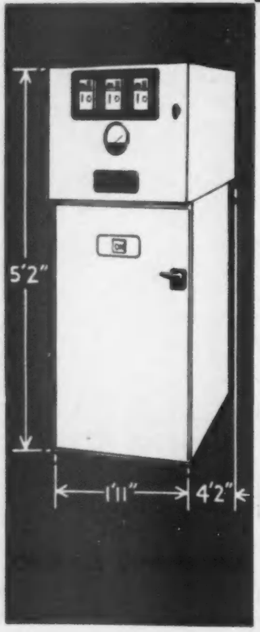


CLASS LMT [illegible]



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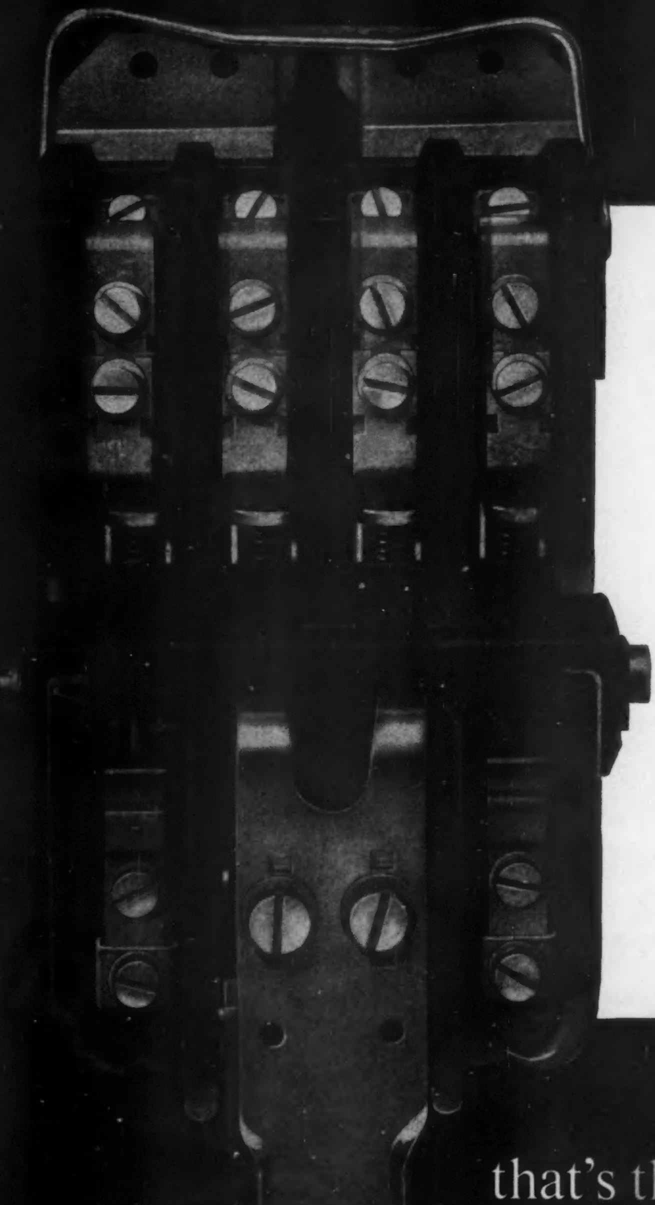

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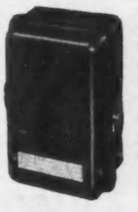

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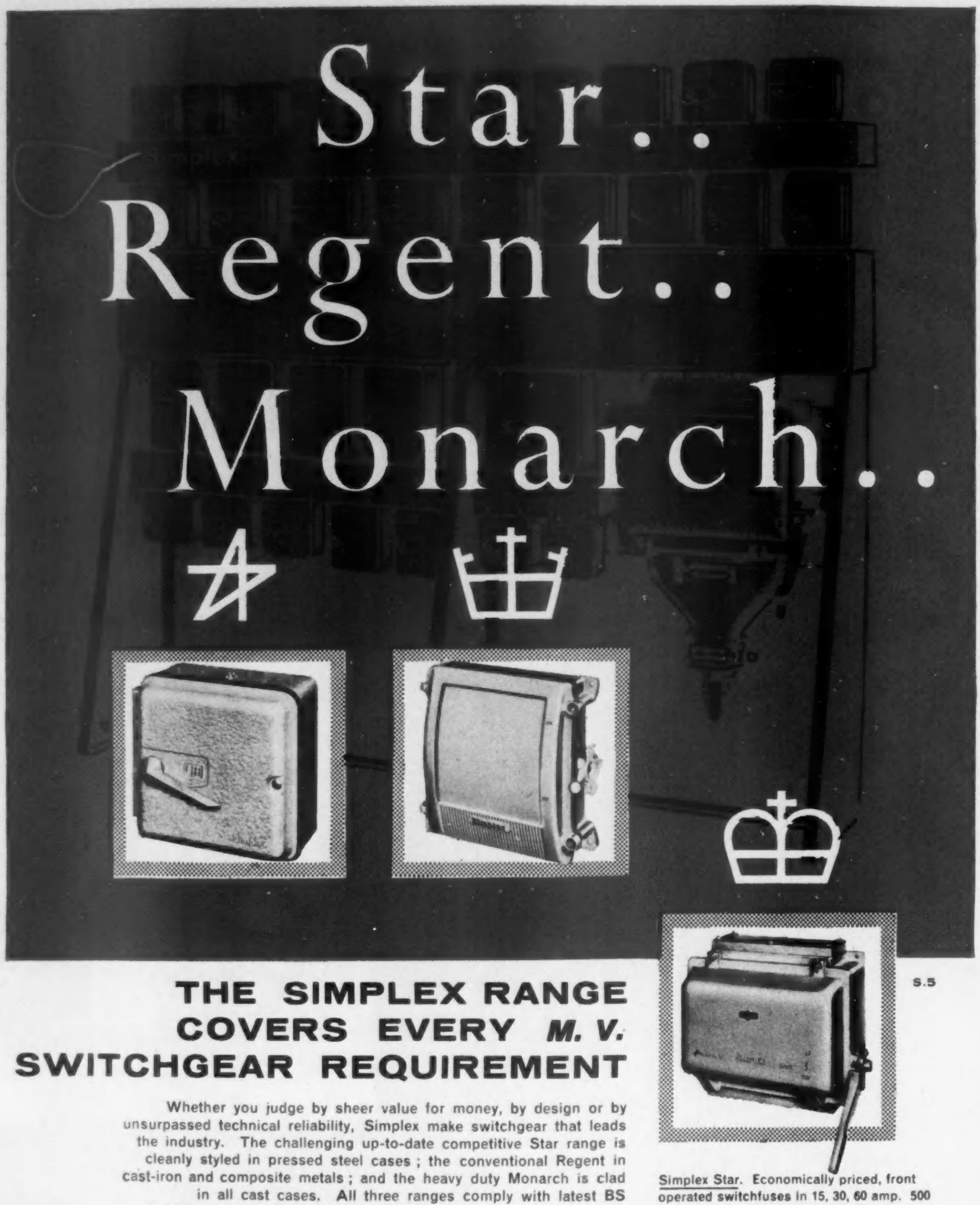

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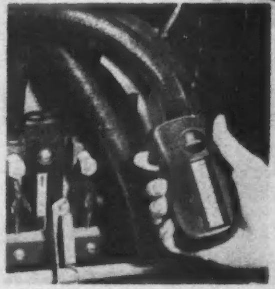
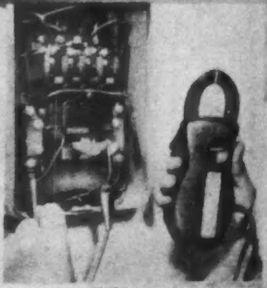


AS AN AMMETER: snapped around conductors to balance circuits.



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AS A VOLTMETER (large photo): check voltage on slipring of motor.

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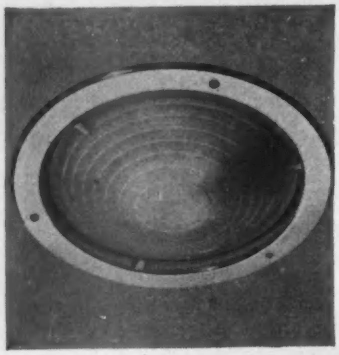

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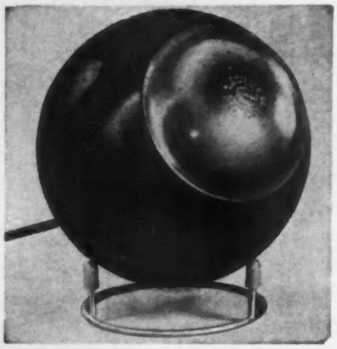

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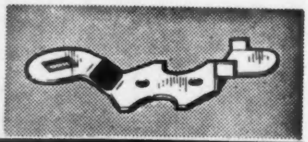

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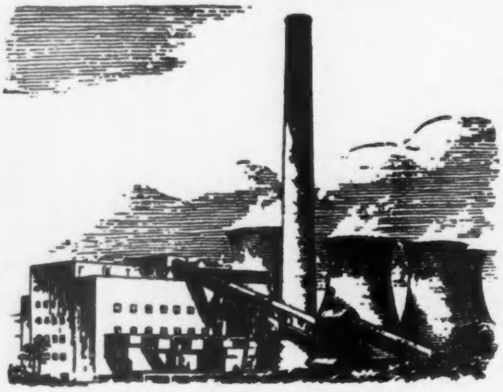

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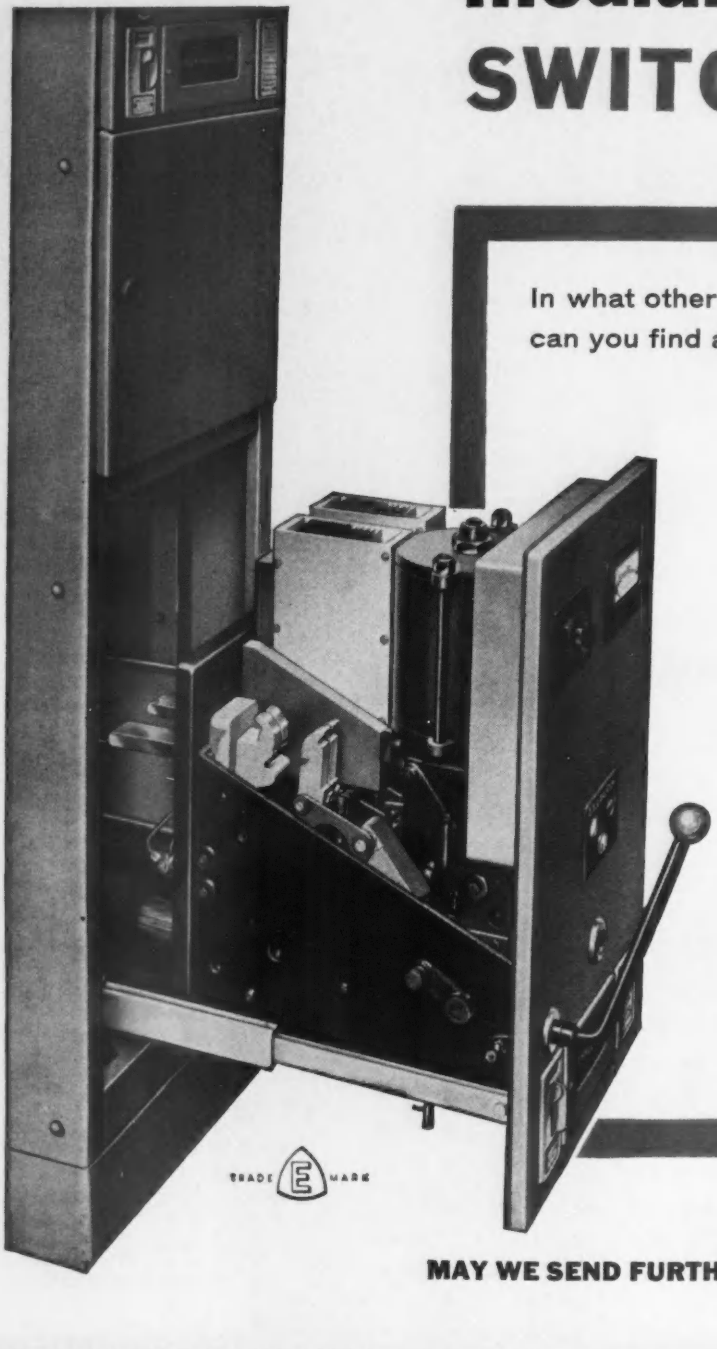

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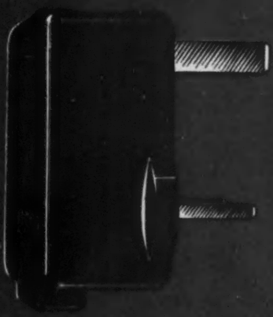

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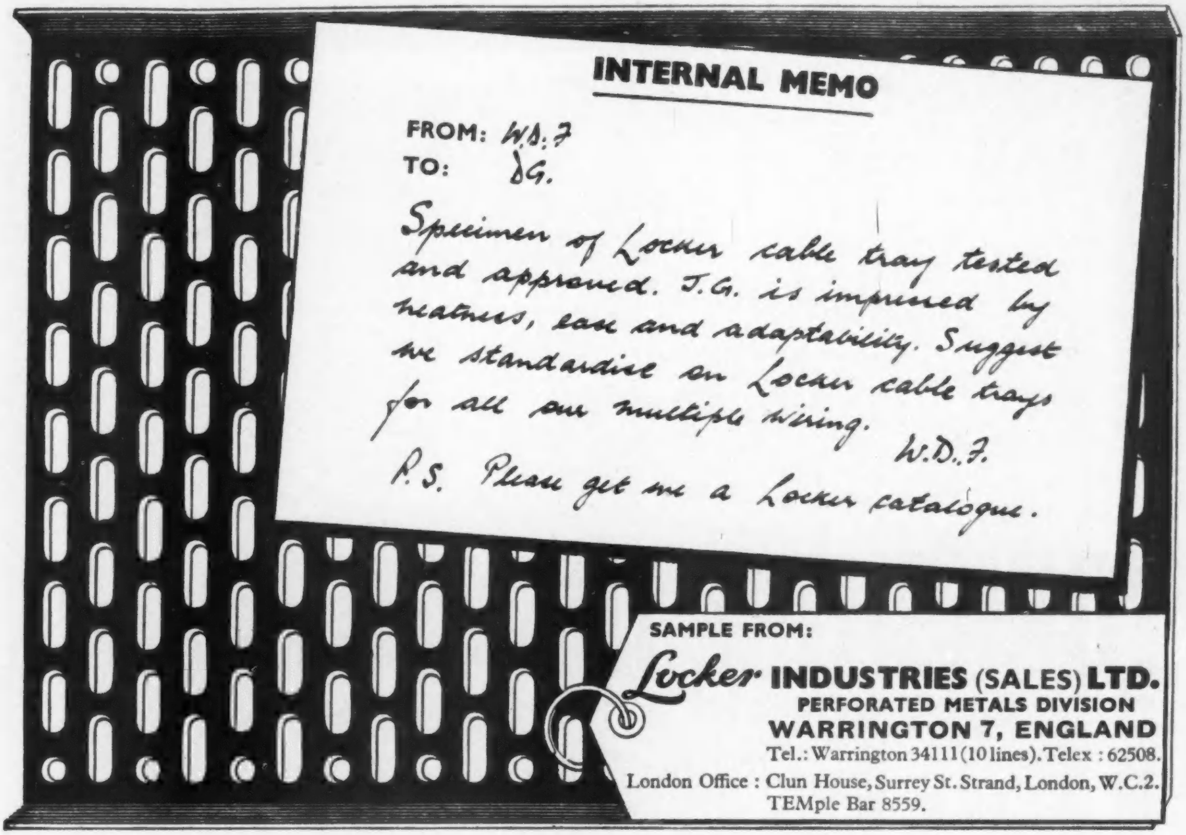

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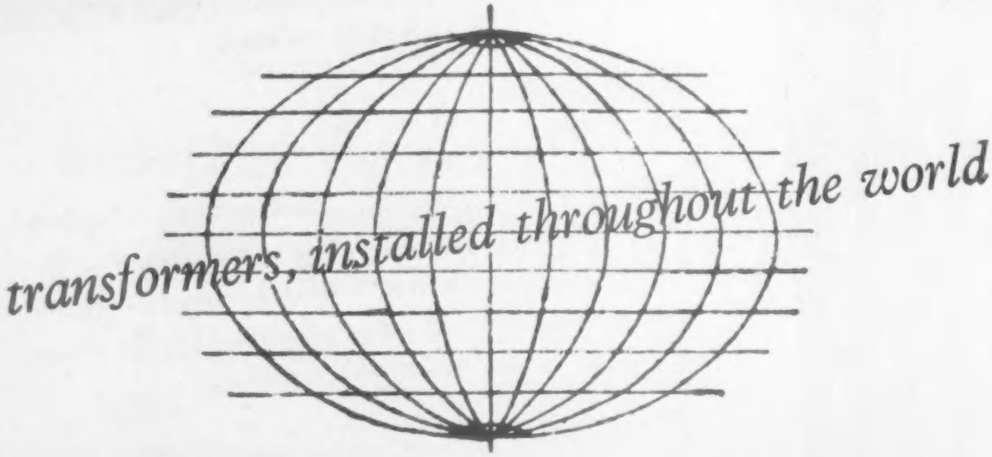
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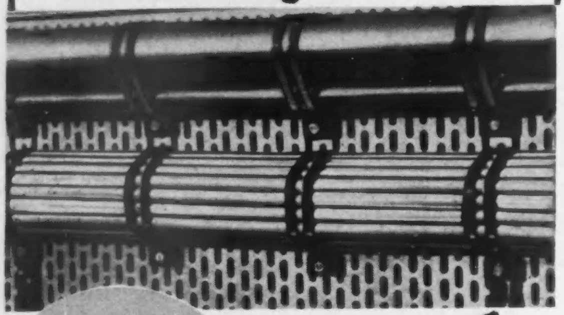

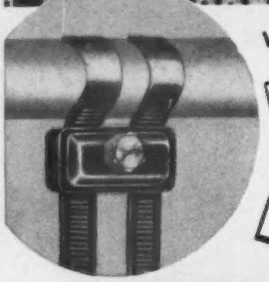

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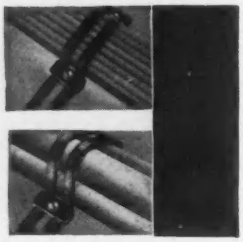

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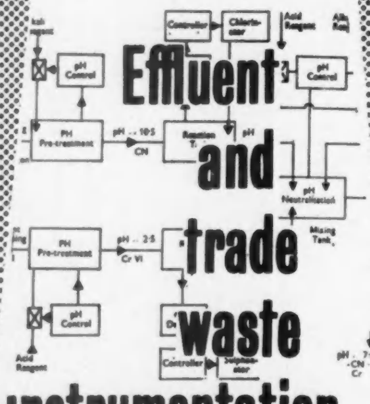
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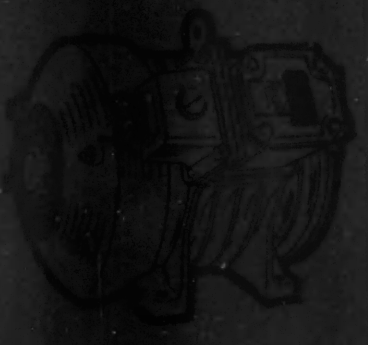

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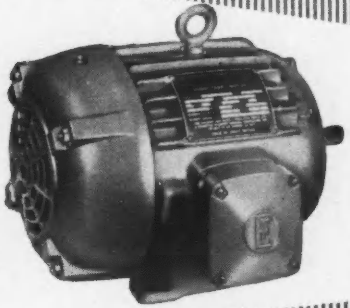

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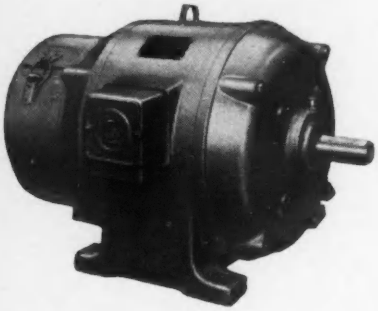

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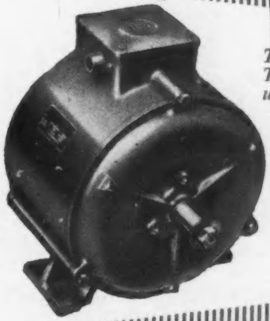

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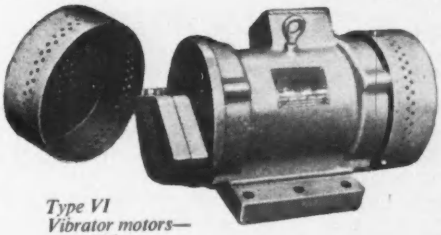

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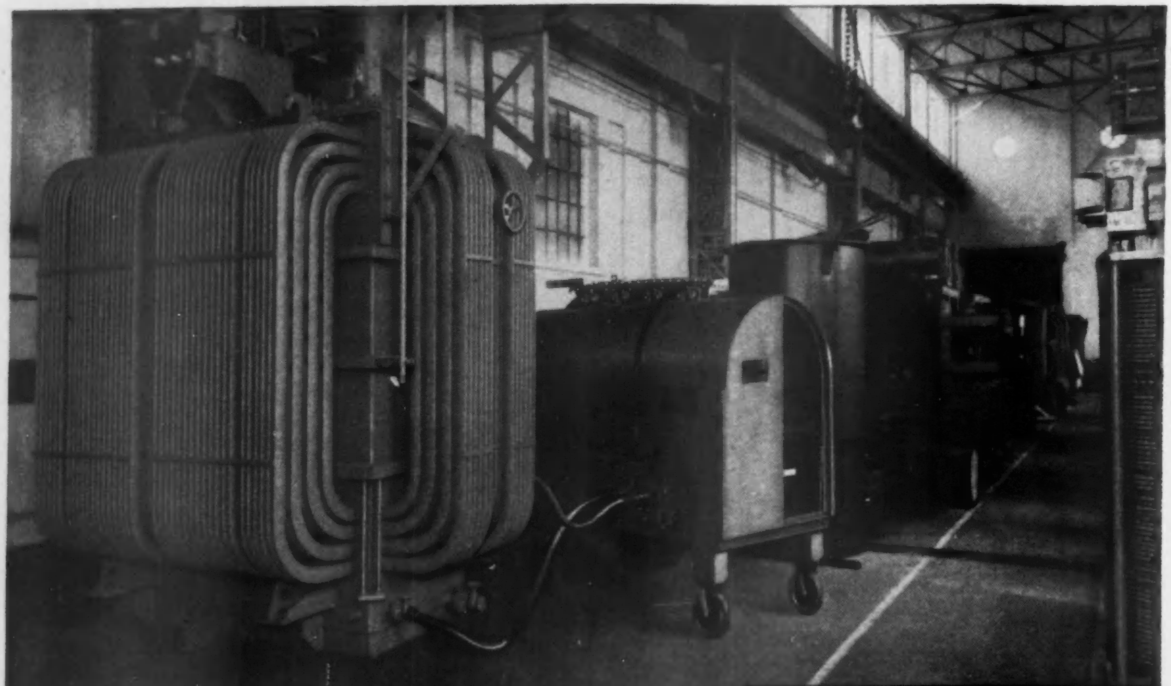

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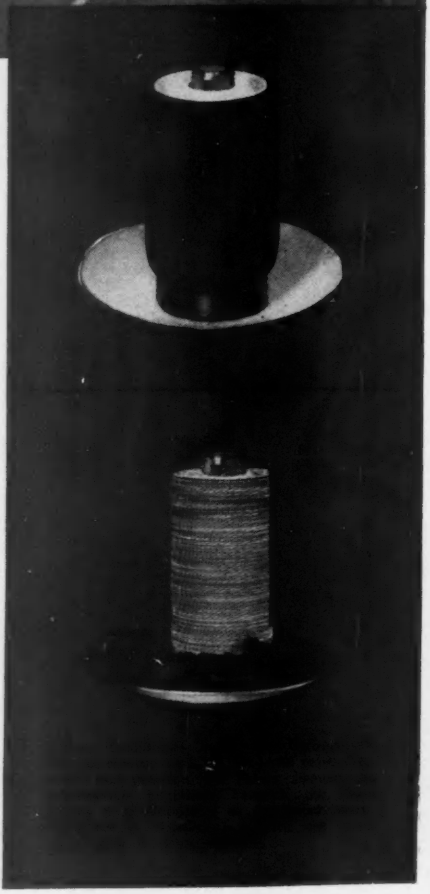

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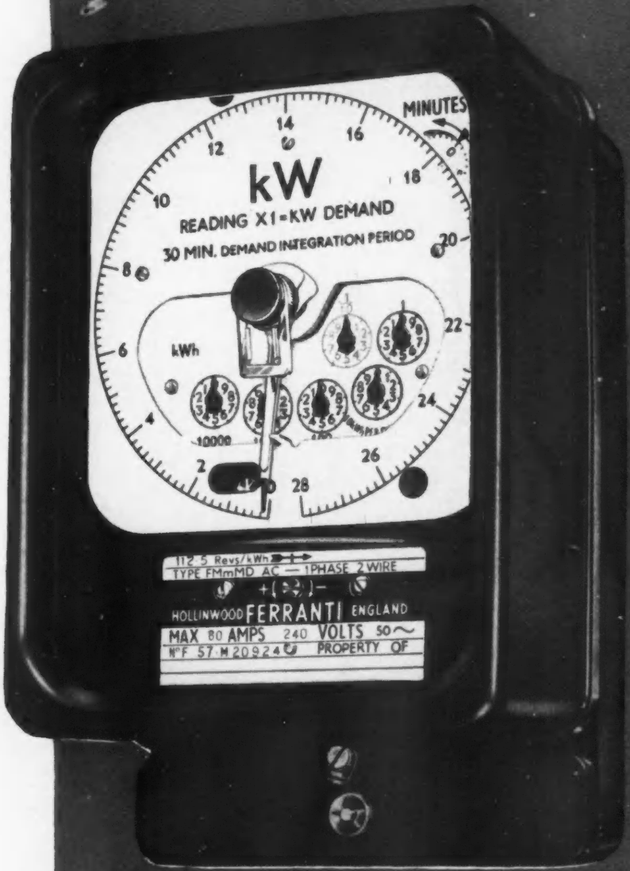
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THURSDAY 5 OCTOBER, 1961
Registered as a Newspaper Volume 140 No. 14

Dans ce numéro

Enseignement de la théorie des machines électriques 479

Les étudiants à l'Université de Londres se servent, pour leurs travaux pratiques, d'une machine électrique rotative qui peut représenter le moteur dit "généralisé" décrit en théorie électrique. L'enroulement stator de la machine peut être connecté de différentes façons. Le rotor comporte deux enroulements distincts: un enroulement imbriqué que l'on relie à des bagues collectrices, et un enroulement ondulé de commutateur.

Distribution de l'électricité 485

Parmi les mises au point en technique effectuées par les autorités chargées de la distribution de l'alimentation publique en Angleterre et au Pays de Galles, citons un usage plus répandu de disjoncteurs à réenclenchement très rapide, ainsi que des expériences relatives à l'utilisation de câbles à isolants en plastique. On a pu réaliser des économies grâce à l'usage de transformateurs en étoile/étoile, ayant des capacités de jusqu'à 20 MVA (33/11 kV) sans fournir de troisième enroulement en triangle. Des essais se sont poursuivis avec des disjoncteurs connectés en parallèle pour faire face aux pannes transitoires.

Eclairage à l'extérieur des locaux 495

Les mises au point relatives à l'étude des lampes fluorescentes pour l'éclairage à l'extérieur des locaux prévoient des tubes ayant une charge accrue (152 cm, 125 W), ainsi que des tubes d'un rendement supérieur, quoique possédant des propriétés de reproduction de couleur moins bonnes. Ces tubes ont été étudiés au cours de la conférence annuelle des ingénieurs éclairagistes. L'usage d'un remplissage d'iode dans un tube de quartz permet d'avoir une lampe à filament de tungsténe ayant une longévité améliorée ainsi que de très petites dimensions. Une version modifiée de lampe fluorescente dont on se sert pour l'éclairage par projection comprend une lamelle que l'on garde claire; cette lamelle constitue une fenêtre étroite donnant une ligne de très grande luminosité.

In dieser Nummer

Unterricht in der Theorie elektrischer Maschinen ... 479

Eine rotierende elektrische Maschine, die den aus der Theorie hergeleiteten sogenannten "Allgemeintyp" verkörpert, wird von Studenten an der Universität London für Versuchszwecke verwendet. Die Ständerwicklung dieser Maschine lässt sich verschiedenartig schalten. Der Läufer besitzt zwei getrennte Wicklungen, und zwar eine an die Schleifringe geführte Schleifenwicklung und eine mit dem Kollektor verbundene Wellenwicklung.

Verteilung elektrischer Kraft 485

Technische Entwicklungen, die von den für die Verteilerseite der Kraftversorgung in England und Wales verantwortlichen Behörden durchgeführt wurden, umfassen die ausgedehntere Verwendung von Schaltern mit Schnellwiedereinsschaltung sowie Experimente in der Verwendung von plastikisolierten Kabeln. Einsparungen konnten durch den Einsatz von Stern-Stern-Transformatoren in Grössen bis zu 20 MVA (33/11kV) erzielt werden, und zwar ohne eine dritte Wicklung in Dreieckschaltung. Versuche mit parallelgeschalteten Schaltern zur Beseitigung von Ubergangsfehlern sind weitergeführt worden.

Aussenbeleuchtung 495

Die Entwicklung von Leuchtstofflampen für Aussenbeleuchtung umfasst Röhren mit höherem Leistungsbedarf (152 cm–125 W) und Röhren höherer Leistungsfähigkeit, deren Farbeigenschaften jedoch herabgemindert sind. Diese Leuchstoffröhren wurden auf der Jahreskonferenz der Techniker für öffentliche Beleuchtung einer Betrachtung unterzogen. Die Verwendung einer Jodfüllung in einer Quarzröhre ergibt eine äusserst kleine, langlebige Wolframdrahtlampe. Eine Abart der Leuchtstofflampe, die in Flutlichtanlagen gebraucht wird, besteht aus einer Röhre, bei der ein Teil der Leuchtfläche in Form eines kleinen Fensters durchsichtig gehalten ist und einen äusserst hellen Strahl durchlässt.

ELECTRICAL TIMES

SARDINIA HOUSE, SARDINIA STREET, LONDON, W.C.2
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ELECTRICAL TIMES

ESTABLISHED 1891

THURSDAY, 5 OCTOBER, 1961

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Joint Editor:
K. C. POUNDS, B.Sc.(Eng.), A.C.G.I., A.M.I.E.E.

News Editor
T. W. WRIGHT

Comment

DOWN TO EARTH

Earthing problems continue to cause concern to engineers specialising in installation work. Our correspondence columns in recent weeks have borne evidence of one aspect of the discussion, the doubt about whether the voltage-operated earth-leakage circuit-breaker is the best solution in all situations where direct earthing is not possible. Another sign during recent weeks has been the continued complaints from the south west, where soil conditions are particularly difficult from the earth electrode aspect. These have been voiced particularly by the local Electricity Consultative Council and concern slowness in reaching decisions at national level on recommendations for dealing with these conditions. But apart from areas where the soil resistivity is particularly high, attention is constantly needed for the in-between areas, where direct earthing has been quite satisfactory so long as the extensive buried water pipe network could be used. We have commented frequently on the difficulties caused by water companies changing to plastics pipes with no warning to the electricity authorities. One of the steps we have advocated in the past is some arrangement for notification. It seems that at last there may be a move in this direction, encouraged by requests from Government departments to the water supply authorities. That will be an excellent and sensible development but one that puts the ball well into the electrical engineer's court. What action is he to advise when the water pipe earth electrode is lost. Earthing to the cable sheath is the obvious answer where practicable, but that is not everywhere. If the water boards make the desired move, the electricity industry must be ready to match it promptly, and that requires the taking of decisions centrally and their promulgation now to the supply districts and individual contractors who will have to apply them.

THE "X" OF EXPORTS

To project the right image of Britain overseas: that is the prerequisite to any substantial increase in our exports in the view of Sir William McFadzean. He was speaking at the annual dinner of the Electrical Engineers' Exhibition and, as one of our major industrialists and chairman of the Export Council for Europe, his experience suggested that too seldom was it appreciated overseas that we have one of the most efficient and progressive industries of the world. Exhibitions are one way of achieving the necessary publicity, and he welcomed the increasing number of UK fairs that opened their doors to international exhibitors. The Electrical Engineers' Exhibition still retains the embargo on foreign goods and the importance of reversing this policy has been urged in these pages. With the present trend of world trade, it can only be a matter of time before such a step is taken and, with the increasing tempo of tariff liberalisation, the sooner the better. The lack of a suitable exhibition centre is a serious difficulty but one that must ultimately be resolved in more suitable accommodation. In the interim it would be better to grasp the nettle of overseas participation, for there will be no great rush of exhibitors of foreign-made goods; goodwill is built up only with the years. Such participation must, in the long run, strengthen the standing of the exhibition. At Hanover, about half the orders placed come from other exhibitors at the fair. While such results of a large horizontal fair cannot be equalled in specialised exhibitions, experience shows that international participation brings buyers as well as exhibitors.

TEN-YEAR TEST

Historically, there is no particular virtue in ten, but the electrical industry has taken to itself the particular yardstick of ten years as a nice round number to double on. This year we felt it worth while looking at some of the commercial parameters of area board performance over the last decade. By 1950-51 some of the pre-vesting irregularities had been ironed out and the nationalised industry was beginning to get into its stride. The histograms on page 485 show some pronounced effects. The clear division in several commercial factors between the south and the north have softened with the years. Area board costs have fallen sharply in the south, particularly those of the South Eastern and Southern boards, but still the average remains well above that of the north, some costs of which have risen slightly. In the domestic sector, the south is increasing its lead but, in considering the number of domestic units sold/domestic consumer, it has to be remembered that the number of domestic consumers has increased more rapidly in the north. The comparative test of £ revenue/£ assets is perhaps less conclusive in the case of the supply industry than in private firms, since the balance sheet figures have a greater artificiality of historical cost, and in some cases pre-vesting assets have been nearly written off. None the less, the figures reveal some of the characteristic economic features of the individual boards.

COLOUR IN THE STREETS

Current attention to the problem of road accidents has naturally been noted in the papers presented at Scarborough this week to the annual conference of the Association of Public Lighting Engineers. Both analysis of accident figures and *a priori* arguments suggest that better levels of lighting can reduce the number of accidents, particularly where high-speed driving is encouraged. The Association's president took these points extensively in his address to the conference. He introduced a departure from the extensive concern for the motorist, however, with his discussion of lighting practice and the pedestrian. Mr Lennox raises the old question of colour of road lighting, attacking the use of colour-distorting discharge lighting with a particularly mellifluous phrase —the harmonious social use of the streets at night lost for one or two decades for a very small cost difference. Indeed, Mr Lennox thinks that those bodies which so persistently harass the lighting engineer regarding the appearance of his lamps during the day, might better expend their energy in working for better colour rendering at night. In this argument the all-round improvement in lamp efficiency combines with development of modified sources to make penny-pruning seem less justified. Yet cost is certain to remain a major factor. So long as relatively small local authority units control street lighting it is sure to be paramount. Mr Lennox suggests that a standard of lighting for traffic routes costing a 1d in the pound rate in a county borough might cost 18s in the pound for some parish areas, hardly a practicable range and clearly an administrative barrier to improvement. An *ad hoc* committee on lighting London traffic routes, which has just reported, counters Mr Lennox by plumping for sodium lighting everywhere save in shopping centres. The case for some central control arrangement is argued by the very existence of the committee.

HEATING AND COOLING FUTURE

The conference organised in connection with the Heating, Ventilating and Air-Conditioning Exhibition has been giving a commendable proportion of its attention to future developments. Authors have shown a willingness to crystal gaze that should prove particularly useful to industrialists who must perforce perform the same exercise. From the papers presented to the conference there stands out a widely held conviction that even in temperate climes like Britain's air-conditioning is going to increase enormously in importance. The electrical engineer is contributing directly to the need for air-conditioning in industry and commerce by providing the means of sharply increasing illumination levels. More lamps mean more heat. The talk on the importance of air-conditioning for the future has not been confined to Olympia. The Midlands EB, which has been so active in the industrial electric heating field, is significantly devoting attention to air-conditioning now. The Press conference on the recent annual report of the Board provided an occasion for chief commercial officer Mr H. J. Gibson to reveal that work is in hand on air-conditioning units for domestic premises, with the aim of producing a living-room unit for as little as £60. With an eye on present planning trends, the MEB are putting the emphasis on reasonable appearance outside the house and quietness in operation; they will need to secure an attractive appearance indoors as well. It will have to be kept in mind, though, that air-conditioning will, in the commercial and industrial applications, produce a winter as well as a summer demand.

Meteor

This week's quick summary of electrical news faces advertisement page 14

Teaching for the '60s

GENERALISED MACHINE AT QUEEN MARY COLLEGE

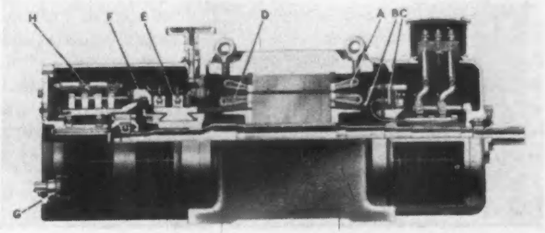


Fig. 2. The generalised machine can simulate the performance of conventional and some unconventional machines. Sectional view. A, 2-phase stator winding for direct and quadrature axes. B, wave-wound commutator winding; C, link board and slip-rings. D, 3-phase lap-wound slip-ring winding. Brushgear: E, hand-operated; F, motor-driven through pinion G; H, cartridge bearing

GABRIEL KRON sparked off something of a revolution when, 25 years ago in the US, he suggested that all electrical machines were really specialised applications of a completely general "primitive machine." Repercussions of his work and the work of Park have been increasingly felt in the educational and design world since then, but it was some years before a "generalised machine" was actually built in the US. A machine somewhat larger than the US version and with certain advantages for teaching has now been made by AEI for Queen Mary College, London University, to the College specification. Last week, over 80 representatives of the universities, technical colleges and industry met at the College for a conference on the teaching of electrical machine theory. Although attention was concentrated on a demonstration of the generalised machine and how it could be used in courses, the scope of the conference was also concerned with the broader issues of inculcating a knowledge of fundamentals of electrical theory and machines and how students could apply them, in a time strictly limited by the ever more pressing need to increase attention given in courses to mathematics and physics.

As a starting point for reshaping courses, Dr G. S. Brosan suggested the principle of training graduates to be useful both to themselves and the community by 1980-90. What was good practice now would probably be redundant by then, so that fostering the correct attitude of mind to problems was more important than their technological solution. Machine theory was important, he said, but it should be put in perspective with other forms of energy conversion; for example, thermoelectric or m.h.d., which might not now be economical or even practical, but which might be in years to come. It should also be borne in mind that the engineer of the future would make his materials to suit his needs rather than adapting naturally available materials as best he could.

A course for the comprehensive, but elementary, treatment of electrical machines at the undergraduate stage was outlined by Prof M. G. Say. An important starting point for such a course was the principles of the electromagnetic/mechanical transducer, with their use to explain devices ranging from lifting magnets to a.c. generators. The "alignment principle" by which "lines" of flux were endowed with longitudinal tension and lateral compression gave an immediate appreciation of mechanical forces, as Prof Say illustrated by animated films. A development of the concept of unified machine theory from physical treatment at an elementary level with, later, mathematical formulation was outlined by Dr B. Adkins, who emphasised that courses should aim at enabling students to analyse and elucidate the problems with which they were faced.

Industrial machine design offered scope for the use of advanced theory and techniques; for example, the use of computers in machine design. A paper by Messrs J. F. Levy and D. D. Stephen urged that the graduate should be made aware of these opportunities to use his knowledge of fundamentals and not be stifled by courses concentrating on design techniques which might well be soon outmoded.

An appropriate laboratory course formed an essential accompaniment to the lecture courses outlined, and Mr A. J. Ellison described such a course starting with the transformer and then using the generalised machine to demonstrate steady state and transient phenomena of d.c. and a.c. machines. Other papers discussed more advanced aspects of the subject.

A description of the AEI generalised machine was given in *AEI Engineering*, Vol. 1, No. 9. The stator has two sets of distributed windings on the direct and quadrature axes. The rotor has a continuous winding connected to a commutator, but also with tappings at 90° and 120° which can be connected to slip-rings. A second independent rotor winding has slip-rings and is star-connected. The brushes may be moved round the commutator by hand. There is also a separate brush set, which can be rotated by a d.c. motor. A load machine is coupled to the generalised machine by a torque measuring device which uses the magnetostrictive effect. The generalised machine can simulate the performance of a.c. and d.c. machines including synchronous and Schrage motors. It is not intended that it should replace conventional machines in the university or college laboratory.

A few copies of the conference papers are available from Queen Mary College, Electrical Engineering Dept., price 10s.

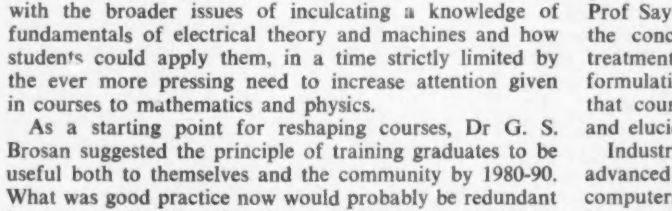


Fig. 1. The generalised machine coupled to, on the left, torquemeter coupling, load machine and tachogenerator and, on the right, brush geardrive motor and tachogenerator

Heating in the future

EXTENDED USE OF ELECTRICITY FORECAST

WHAT the heating and ventilating engineer has to look forward to in technical development over the next decade was one of the principal subjects discussed at the International Conference organised by the Institution of Heating and Ventilating Engineers last week and this. The conference, which finished yesterday, was held in association with the first Hevac exhibition, some of the exhibits of which are pictured opposite.

UK Prospects

Prospects in the UK over the next ten years are discussed in a paper by Mr N. S. Billington, director of the Heating and Ventilating Research Association. One of his basic points is that the art of heating and ventilating is becoming more and more akin to an exact science, though it will probably never attain that status.

Mr Billington takes the view that electrical energy will eventually be the only fuel for heating and ventilating, though the next 20 years may not see great changes along those lines. Solid fuel will disappear from the market quite early, he believes, with oil and gas replacing it. If electricity is ultimately to be the main source of energy, then central heating systems as known today will disappear, being replaced by units related to individual rooms. This, combined with development of thermo-electric devices already beginning to appear, will bring the possibility of both heating and cooling—complete air-conditioning—with simple local control.

Even before thermo-electric conditioners become commercially available, the turnover to electricity will gain momentum. In this connection the recent history of off-peak electrical storage points the way. Even if demand peaks did not cause the electricity supply industry to promote off-peak heating, there would be an assured feature for electric panel heating. Mr Billington envisages a building with good insulation within the shell and with walls and ceiling carrying on the internal surfaces electric wallpaper or some similar device. If used "on-peak" this could provide rapid response to control and maximum economy of operation. Current experience suggests that continuous heating is needlessly expensive in terms of thermal input. Given a suitable building and a heating system of low capacity, substantial economies can result from intermittent heating. However, to achieve such conditions, adequate control must be secured.

Air-conditioning

Developing the theme that simple heating and ventilating will gradually be displaced by air-conditioning, Mr Billington suggests that high-velocity air systems as at present conceived will disappear. He thinks a liquid medium is likely to be used, with an individual plant serving each ten floors of multi-storey offices, for example. He has hopes of a new refrigerant being developed which, through an alteration of the working pressure, will allow a single pipe system to be used without change for winter heating and summer cooling. One of the requirements of such a scheme will be a change from concentrated to extended heating surfaces such as panels.

Even in moderate climates, winter cooling rather than heating may become a major problem. This is brought about by provision of large windows and the growing intensity of artificial lighting. The lighting load, being substantially constant, poses no particular difficulties for the air-conditioning engineer, but the variability of solar heat gains is more troublesome.

With such developments in prospect, there is a case for making heating and ventilating systems in buildings being erected at the present time of limited life, so that it becomes economically reasonable to scrap them and replace with improved equipment as this becomes available. This argument applies with greatest force to industrial buildings, less so to offices.

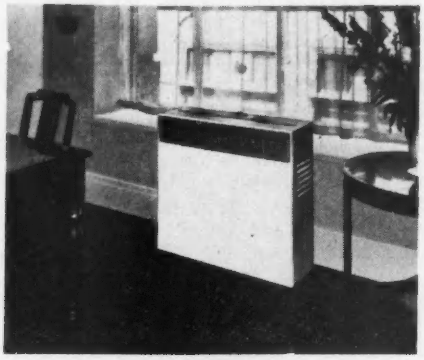
Continental Opinions

A Continental view of probable trends was given to the conference in a paper by Mr R. Cadiergues, director of a French organisation. He thinks it likely that the next decade will be marked in heating by development of collective air-conditioning, with central production of chilled water as well as hot water. He foresees better heat insulation of buildings as a development helping forward this trend. Storing heat or the energy to produce it, he thinks, will become more common but, in referring to British experiments in electrical heating, he contrasts the position on the Continent, where electric heating is relatively rare. Electricité de France, he says, is very attached to economic theories and to payment on the basis of marginal cost, which makes the use of electricity for space heating unpopular. It is impracticable to use electric floor-warming except in experiments, when the supply industry approach is "a kWh used in winter in an electric radiator at peak hour costs more than 20 times the kWh used by electric chemistry in a summer night."

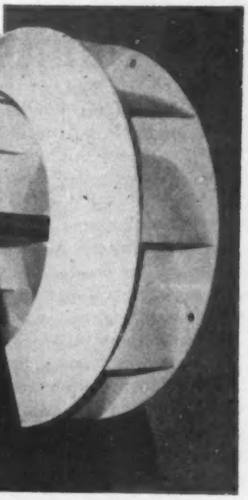
Combined heating and electricity generation is a technique which Mr Cadiergues thinks likely to be extended by development of the gas-turbine. He quotes an Escher-Wyss closed-cycle gas-turbine plant at Ravensburg for this application, which has run for 27,000 hr. He also expects heat pumps to extend in their application, while he speaks of the "brilliant prospect" offered by exploitation of the thermo-electric effect.

Mr I. Livchack presented to the conference a paper on current trends in heating techniques in the USSR. He reports widespread use of high-pressure hot water district heating schemes. Currently, attention is being given to combined air heating and ventilation, and a system has been developed for mass construction of blocks of flats with the accent on simplicity of installation and low electricity consumption. This system is based on the use of hot water from a central station, giving up its heat to the air with some provision for air humidification at low temperatures. In noting that his paper deals only with a system of central heating, Mr Livchack comments that "local heating, although still used, has no future."

Heating, Ventilating, and Air Conditioning Exhibition

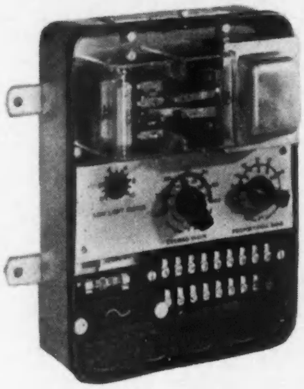


"Californian," an unobtrusively styled air conditioning unit from GEC which is suitable for office use. It has thermostatic control and is equipped with a 2 kW heater

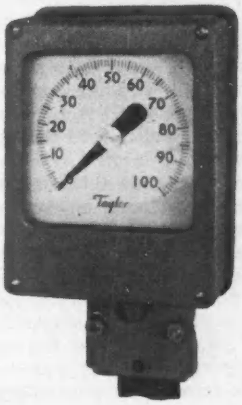


Although this 5 ft fan has no visible means of propulsion, it can be stopped by hand and is self starting. It is, in fact, powered by a flat linear motor mounted on the inside of one of the pedestals

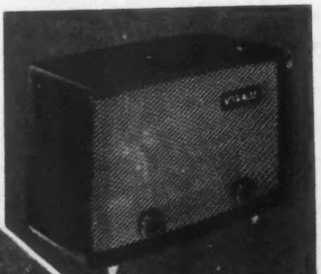
Growing interest in heating, ventilating and air conditioning in industrial, commercial and domestic spheres has made possible the first International Heating, Ventilating and Air Conditioning Exhibition which closes tomorrow after ten days at Olympia. In conjunction with the exhibition the first international conference on the three subjects attracted representatives from many countries, including the United States and Russia. The general trend was more towards industrial applications, for this accounts for a large proportion of the industry's revenue which has increased rapidly in the past five years.



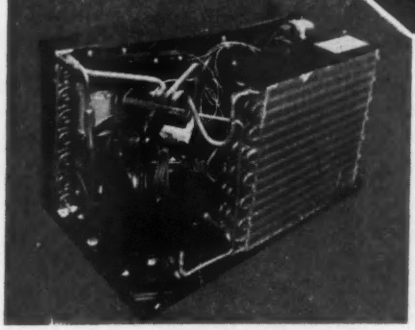
A new electronic modulating control system for heating and ventilating installations. It has been introduced by Satchwell under the name of "Monotronic"



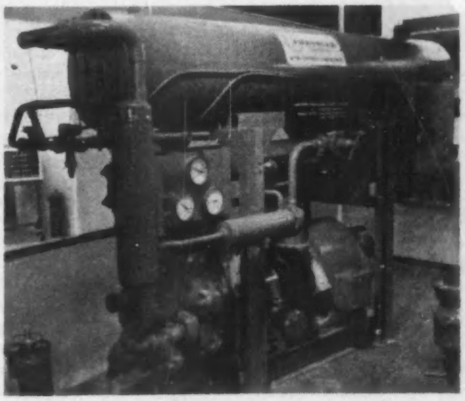
On view for the first time, is this indicating pressure transmitter by Taylor Controls Ltd. It can be supplied in indicating and non-indicating forms



Compact in size the "Vita-aire" negative ion generator from the International Products Division of Thermotank is said to purify the air



A 1 h.p. Chrysler Airtemp reverse cycle unit designed to heat or cool as required. This elevation shows rear view



Another Chrysler Airtemp exhibit is a packaged liquid chiller, one of the radial type in a range from 15 tons to 100 tons

Exhibitions and Exports

EXPORTING by the British electrical manufacturing industry was well to the fore in the speeches at last week's Electrical Engineers Exhibition dinner, held at Grosvenor House, Park Lane, under the chairmanship of Mr R. F. Mathieson, chairman of the exhibition company. The export line was hardly surprising with Sir William McFadzean amongst the speakers. He replied to the toast "the exhibitors and the exhibition," and did not delay long in declaring his faith in exhibitions. Fundamental to successful exporting was to sell the goods; and exhibitions played a vital part in showing off British goods and in helping the seller meet the buyer.

Sir William complained that the right "image" of Britain was not being got across. There was too much emphasis on tradition, and too seldom was it appreciated that Britain was a nation having an extremely efficient and progressive industry comparable in many ways to any in the world today.

Foreign Exhibitors

So far as exhibitions in London were concerned, Sir William complained of the shortcomings of present exhibition facilities. He revealed that a working group set up by the FBI with the approval of the Board of Trade to go into this matter hoped to submit its report before the end of the year. Absence of sufficient facilities not only made it difficult to present exhibitions, but also to attract foreign exhibitors to them as well as foreign buyers. Sir William thought that there had been too much insularity in this matter in the past. He was delighted at the trend for an increasing number of specialised trade fairs in the UK to become international.

The question of overseas exhibitors was touched on as well by Mr Mathieson. Recalling that the exhibition regulations at present restricted exhibits to goods produced in the UK, he said that this restriction had enjoyed the full support of the vast majority of exhibitors. However, it might have to be re-examined. Mr Mathieson assured exhibitors that no decision would be made as to changes in policy until the exhibition company were satisfied that they were in the interests of all concerned.

Mr Mathieson emphasised his belief in the value of restricting admission to the exhibition to ticket holders rather than making it public. There was continued high demand for space at the exhibition, at which the first-floor feature would be "Electricity in Aviation." He called for exhibitors to help the organisers gain publicity for the exhibition overseas by providing more information.

The principal guest at the dinner was Air Marshal Sir Herbert Spreckley, controller of engineering and equipment, Air Ministry. His theme was the need to increase the reliability of electrical equipment in aircraft—although he quoted figures to show that, so far as serious faults were concerned, it was extremely reliable already. Any lack of reliability even in small details meant duplication for the sake of safety, with consequent loss of pay load. Sir Herbert spoke to the toast, the electricity industry. The reply was made by Sir Charles Westlake (chairman, Metal Industries Ltd.), who said there would be no disagreement that entry into the Common Market would be a challenge to British industry. As a business man, whatever sentimental feelings he had about the Commonwealth, he had to recognise that it was essential for Britain to become a member of the Common Market. The British home market could only absorb a certain volume of output. There was much more scope in Europe—but industry had to be ready for competition from European manufacturers. He thought the electrical industry could be proud of the standards of its products, but that it was guilty of giving insufficient attention to appearance.

Sir Charles went on to regret the break up of many trade agreements as a result of the RTP Act. He was concerned in case this led to senseless competition which would benefit no one. The public interest with which the RP Court was concerned might not always be the same as the national interest. Nationalised industries took about 50% of the electrical industries' output and they were hard bargainers.

Appliance Survey points to Future Needs

FUTURE requirements of domestic appliance users come to light in a comprehensive report issued by the Electrical Association for Women. It is the result of a postal survey conducted in mid-1960 during which some 3,000 EAW members stated their views. Many suggestions for improvements or new equipment have already been carried out but, significantly, a strong plea was made for safety in design.

Greatest interest was shown in irons, with vacuum cleaners following a close second, but cookers and refrigerators lagged well behind. However, when asked to list appliances in order of personal precedence many people were unwilling on the grounds that all their electrical equipment was essential.

Information on repairs showed that in the majority of cases appliances gave trouble-free service. This was particularly noticeable in the case of older appliances. Less than one-tenth of all vacuum cleaners more than ten years old had needed no repairs. Weight appeared an important factor when irons were purchased and the swing was towards lighter steam models. Speed of heating became a secondary factor, but demands for stronger and longer cables were made.

More than half the clothes dryers owned were less than two years old, and general opinion seemed to be that spin dryers did not get clothes "ironing-dry." The tumbler dryer was preferred for efficiency, and requests were made for a combined spin/tumbler dryer.

Cleanliness and oven capacity still remain in the forefront of cooker requirements although speed of oven and ease of boiling-plate control were also important. Even though time-controlled cooking gained popularity, just under half of those surveyed, who had this control on their cookers, used it less than once weekly and only one-tenth used it daily. Common among requests was that for greater ease of cleaning oven interiors. Time control for all parts of the cooker was also advocated.

Quicker and more easily controlled heating topped suggestions for improvements to water heaters, most of which were the immersion type. Requests were also made for a combination geyser and storage heater.

Since the survey was conducted, many developments have been made in home laundry equipment. Even so, a desire for space-saving was expressed in the idea of a comprehensive sink unit which included washer, cooker, food mixer and waste-disposal unit.

Keen interest was taken in heating systems, more especially in heated carpet underlays, although ducted air and skirting board heaters controlled by switches were also advocated.

Readers Views

Correspondents writing under pseudonyms are asked to submit their names and addresses in confidence to the Editor

Heating Control

MR GRANT'S article in the ELECTRICAL TIMES of 14 September on the Control of Electrical Heat Storage Systems has, if nothing else, spotlighted the importance of the part played by the controls in such installations. It is most unfortunate, however, that some of the assumptions and views put forward in this article cannot be supported by the facts.

My first criticism concerns that part of the article devoted to room thermostats, where there appears to be a contradiction. While I agree with the well-known and accepted principle that with convection heating and intermittent heating generally, some form of accelerated operation is advantageous; I fail to see how this can be used as an argument in favour of the use of accelerator-heater-operated room thermostats for controlling electrical heat storage systems, where any such pulsing effect must reduce the use of the full installed load.

A more serious contradiction occurs in the part dealing with temperature/time regulators. Mr. Grant admits that it is essential to take into account the occupational habits of the user before deciding upon the method of control to be adopted. In his quoted case of multi-storey flats with floor-warming as background heating only, he concedes that it is "most desirable" that charging should commence as soon as energy becomes available. Practical experience has proven that this is not merely "most desirable" but is, in fact, essential if one is to satisfy the occupational habits of the tenants. Once he has conceded that immediate commencement of charge is desirable, it must naturally follow that this charge must continue uninterrupted until satisfactory comfort conditions have been obtained. The use of correctly sited, non-accelerated room thermostats, or a temperature/time regulator, or a combination of both will meet these requirements—which simply cannot be fulfilled by any proportional control system which regulates the energy input in pulses.

The disadvantage of room thermostats is that they might continue to call for heat long after the occupants have retired for the night, and economy would be sacrificed. The ideal control would be the temperature/time regulator with the charge being interrupted, say, one hour before bedtime and re-instated in the early hours of the morning. Mr Grant must also be criticised for distinguishing between background heating installations and those designed to give full comfort conditions. If an early commencement of charge is desirable for the former, it is imperative for the latter where, presumably, there is no supplementary heating available.

The above argument applies equally to the control of industrial or commercial installations. To suit the rather different occupational habits, it is most desirable in such cases to delay the charge until the last possible moment.

I must also disagree, therefore, with the broad statement that the savings to be effected by delaying the charge until the last possible moment is a negligible factor which can be dismissed. This has certainly not been my experience, particularly with the larger installations.

In yet another part of the article, Mr Grant describes the action of the proportional type of controller and argues that this can be said to give a theoretical difference of charge from 0% to 100%. This, in fact, is much more theoretical than actual, a fact which applies to any type of heater and bimetal arrangement, as can be seen from the performance of the normal energy regulator. Although this type of instrument does have a "fully-on" and a "fully-off" position, there is quite a large non-variable proportion both at the top and the bottom which have the effect of considerably reducing the range of the proportional band.

I. G. Maclaren,
JOINT MANAGING DIRECTOR,
ROBERT MACLAREN AND CO. LTD.,
GLASGOW C5.

Water Heating

I AGREE with Mr Honey regarding the rather poor design from the radiation point of view of my storage tank, which has unfortunately become quite popular with builders due, no doubt, to the ease of installation.

Regarding the SWEB installation, I feel Mr Honey has misinterpreted my letter. It was my intention to indicate that the SWEB cylinder and cistern were over-all lagged by the third layer of insulation.

This experiment was, therefore, carried out using a greater degree of insulation than Mr Honey employed, and I would consequently expect his standing loss to be greater than the 21 units loss experienced in the SWEB experiment.

I still wonder if the degree of insulation of Mr Honey's cylinder is sufficient to warrant his reply to *Megohm*?

Finally, I would agree that adequate lagging is, no doubt, one answer to economic water heating; but Mr Honey's concern regarding the temperature rise in the cold water cistern leads me to the conclusion that his system, like my own, leaves a lot to be desired as a means of providing an efficient source of constant hot water.

G. M. McIlwrick,
EDINBURGH.

Current-operated E.L.C.B's

I WAS interested to read the comments of Mr Nicholson and, subsequently, of Mr Marryat on the subject of earth leakage protection, with particular reference to possible applications for current-operated e.l.c.b's.

Certainly, as Mr Marryat has pointed out, there are some applications where the current-operated type of e.l.c.b. does offer special advantages over the voltage-operated type. In practice, these applications usually come under two main headings. First, there are the installations where selective operation is required. Secondly, there are the installations where very good parallel earth paths exist but where the overall earth-fault-loop impedance is not quite low enough to permit the use of direct earthing.

This latter condition, incidentally, is only too often complicated by the fact that the parallel earth at the consumers' end is a somewhat better earth than that at the supply authority's neutral earth electrode.

Thus, for applications of this nature, there is undoubtedly a field for a reliable current-operated type e.l.c.b., providing it is available at a reasonably competitive price. These are the two basic requirements, and the major single factor affecting both reliability and price, in the writer's opinion, is the question of what is an acceptable practical level of sensitivity.

It is already past history that the early days of the voltage-operated type of e.l.c.b. were bedevilled by the somewhat meaningless operating-current limitation of

30 mA embodied in the Tenth Edition of IEE Wiring Regulations. As a result, the early makes of voltage-operated e.l.c.b. tended to be hypersensitive; they were precision-built instruments suitable for mounting in a glass case—not units which could stay for years on the wall of a cowshed and still remain capable of performing their duty on the one instance that it was absolutely essential that they did work.

Obviously, we must be careful that we do not repeat this error with the current-operated type of unit. For this reason, the developments at present taking place in France, as mentioned in Mr Marryat's letter, are of some considerable interest, as we would now seem to be thinking in terms of protecting people from the possibility of a lethal shock—not just from touching installation metalwork—but actually from touching a live conductor.

Unfortunately, for a circuit-breaker to give complete protection to anyone touching a live conductor, it will probably be necessary for the unit to be responsive to earth-leakage currents of the order of 25 mA, and whether this is a practical proposition, or whether the unit will be abnormally sensitive, remains to be seen. The French certainly are very cautious about this point, and in one particular make have fitted a switch which enables the sensitivity to be reduced to about 250 mA, if the 25 mA proves prone to nuisance tripping troubles, due to transient switching surges or to transient leakages on the installation.

In this connection, it is as well to keep this problem in proportion and realise that quite a high degree of sensitivity is involved. With the voltage-operated type of e.l.c.b., we are only concerned with a direct measurement of voltage between installation metalwork and the general mass of earth. If it can be measured by means of a normal voltmeter it should equally well be possible to measure it, and to isolate the installation if it exceeds a predetermined value, by means of a voltage-operated e.l.c.b.

With the current-operated type of e.l.c.b., on the other hand, there is no question of a direct measurement of earth-leakage current. Instead, we are trying to detect relatively minute differences between two or more fairly large currents, all of which are probably varying fairly rapidly and most erratically.

Indeed, if we are thinking in terms of a 30 A e.l.c.b. detecting 25 mA out-of-balance current, a very fair comparison, in possibly a more mundane field, would be a greengrocer trying to weigh out reasonably accurately a pound of plums—not by direct measurement—but by placing them on the rear seat of his 1½ litre motor-car and then weighing the car both with and without them.

Possibly a far more practical approach to this question of sensitivity, in the immediate future, would be to continue to protect our live conductors by our installation metalwork and simply concern ourselves with ensuring that this metalwork cannot remain live at a lethal voltage to earth. We can then think in terms of a somewhat coarser degree of sensitivity, with a 30 A circuit-breaker only having to detect currents of the order of ½ A, or possibly 1 A, out-of-balance.

Allied to this we would need to ensure that the earth-electrode resistance remains at a reasonable value; but with a sensitivity of 1 A out-of-balance, this would still permit an electrode having a resistance of the order of 25 ohms to be used and still ensure reasonable freedom from any shock risk from installation metalwork.

If we adopt this as our objective, the idea of a reliable current-operated type e.l.c.b. at a reasonably competitive price could well become a practical engineering proposition. Even then, it should be realised that a current-operated type e.l.c.b. is inherently a more expensive type of unit than the voltage-operated e.l.c.b. of the same current rating, due to the additional cost of the core-balanced transformer and the associated means of amplifying the output from this transformer.

On the other hand, if we try right from the outset to make these units so sensitive that they will trip out immediately anyone touches a live conductor, we may well find that we have gone from a reasonably practical engineering proposition to a laboratory-type instrument that cannot be produced either sufficiently mechanically robust or at a sufficiently competitive price for it ever to offer a reasonable solution to the problem of effective earth-leakage protection.

J. A. Robbins, B.SC., M.I.E.E., A.M.I.MECH.E.,
J. A. CRABTREE LTD., WALSALL.

* * *

MR NICHOLSON'S statement (14 September), that voltage-operated and core-balance e.l.c.b's both require an earth conductor, does not appear to be correct. Core-balance e.l.c.b's of all-insulated construction are available and no earth connection is necessary to secure correct operation. Furthermore, the earth-leakage trip current of 5 amp mentioned can be reduced to suitable design. 0·5 amp is regarded as a sensible and stable earth-leakage operating current today.

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H.M. ELECTRICAL INSPECTOR OF FACTORIES,
LEEDS, 1.

Brush Mounting and Machine Adjustment

IN the very comprehensive article on brush mounting and machine adjustment in your 21 September issue there is one misleading statement which I feel should not be left uncorrected.

In the diagram Fig. 4 and the corresponding text on page 420, the impression is given that brush potential measurements, from which the lower diagram of Fig. 4 can be derived, are made between the top and bottom of the brush.

In fact, the potential to be measured is that between the brush and the commutator at various points across the brush thickness. This potential is a measure of the current density under the corresponding portion of the brush surface.

The measurement is made by the aid of an insulated chisel-edged pilot brush which is held against the commutator at a number of points within the brush arc. The voltmeter is connected between the pilot brush and the corresponding brush arm.

The plotting and interpretation of the results are as explained in Mr Johnson's article.

Two other points require comments:

The friction of the brush in the brush box is liable to make the measurement of brush pressure, using the method described, rather an indefinite one. A more precise method, to be recommended whenever practicable, is to attach the spring balance to the operating tip of the pressure finger by means of a loop of tape, and to place the piece of paper, by which the point of pressure balance is sensed, between the pressure finger and the brush top.

When circumferential brush stagger, as described on page 420, is applied to a machine on which the brushes have previously all been in line, the brush axis will then be the centre of the total brush arc (single brush thickness+stagger) and the brush rocker will have to be moved to bring the brush axis back into the neutral position.

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Area board review

1960–61 REPORTS SURVEYED

READING through the 12 area board reports for the supply industry's financial year 1960-61 leaves an impression of a fairly equable period, with tariff increases forced on the industry, but agreed to by the consultative councils without much opposition. Sales of electricity were buoyant, and although service centre trading slumped from the previous year's levels, it was still vigorous compared with a few years ago. On the technical front, development continued apace, relatively unhampered by extreme weather difficulties.

Engineering

Reinforcement of existing networks continues to be a major matter of concern everywhere. LEB say, for example, that many old transformers on their network, and about 1,450 standard distribution transformers, were loaded beyond nameplate capacity even during the comparatively mild winter peak experienced last year. Several boards comment on the high proportion of their capital spending that is concerned with reinforcement rather than new supplies—SEEB 53%; MNWEB 39·2%; NEEB 47·8%.

Acquisition of substation sites is a problem mentioned in many reports. Use of buried transformers is helping overcome planning difficulties in some cases. In urban areas, it is clear that new building schemes are being watched closely to ensure that space for supply equipment is obtained if at all possible. LEB may again indicate the magnitude of the problem. The Board are intending to commission 20 new main substations in the coming three years.

EEB report concern about supply in their Finchley area, due to delays in planning approval for a 275 kV CEGB line. The supply to about 145,000 consumers with 230 MW load is said to be insecure not only at peak, but throughout the 24 hours.

Two boards discuss system control. EEB report a new system of remote supervision of substations by electronic techniques over pilot cables being developed to give control centre engineers visual indication of the position of each switch. EMEB, having reviewed their system control arrangements, have decided that the best method for them is control in each sub-area. A five-year plan has been drawn up to establish suitable control centres manned 24 hours a day and controlling all h.v. operations within the sub-area.

Most boards report increased use of automatic reclosing switchgear to improve supply continuity. EMEB have been investigating what types of existing substation switchgear are suitable for conversion to high-speed reclosure.

Amongst individual engineering developments reported, one of the more interesting is the EEB decision to save on costs by employing star/star connected 33 kV transformers without a tertiary winding in ratings up to 20 MVA. This same Board report significant cost savings through using corrugated aluminium sheathed ductless oil-filled cable at 33 kV. A p.v.c. protective covering is used. SEB report progress with plans for a 132 kV wood-pole line from Salisbury to Shaftesbury. SWEB are pressing on with plans for a third 3 MW gas turbine generator. NEEB, who have been using a series capacitor on an 11 kV line to improve voltage regulation, report continued satisfactory operation, with promising results from a modified design of spark gap across the capacitor.

Research

In area board operations, routine engineering development shades into research activity, with no clear line of demarkation. For example, many of the boards have now laid and energised distribution systems using plastics insulated cables, and are working on the jointing problems involved. Nine districts of the SEB are carrying out investigations of this sort, and one p.m.e. bare concentric neutral cable network has been laid. The extensive work of the MEB in this field is continuing as well. NEEB report commissioning of a l.v. system in which all l.v. distributors and services are of the p.v.c.-insulated type. Three designs of cable are being used, three-core copper with stranded

Table I. Area Board Commercial and Engineering Statistics, 1960-61

Area Board	Consumers at 31.3.61 x 1,000	Increase during year x 1,000	Net maximum demand MW	Maximum demand 1959-61 MW	Load factor %	Increase in circuit miles of h.v. lines and cables	Increase in circuit miles of l.v. lines and cables	Consumers changed to standard a.c. supply
London	1,787	15	2,625	2,489	39·6	132	67	135,418
South Eastern	1,285	31	1,718	1,645	42·9	276	217	38,579
Southern	1,427	39	2,232	2,093	44·2	487	355	13,556
South Western ...	789	17	937	876	48·3	609	200	8,070
Eastern	1,835	46	2,613	2,495	44·8	647	401	11,647
East Midlands	1,364	29	2,087	1,931	46·6	352	304	26,473
Midlands	1,453	30	2,724	2,510	46·8	507	312	18,934
South Wales	653	14	1,121	1,022	62·1	799	101	8,499
Merseyside and N. Wales	946	20	1,438	1,294	52·5	579	240	6,417
Yorkshire	1,539	23	2,590	2,292	49·5	430	291	31,049
North Eastern	1,058	19	1,325	1,203	53·9	283	198	1,063
North Western ...	1,671	26	2,620	2,416	47·9	358	263	9,367

Table 2. Area Board Results compared with 1959-60

Area Board	Cost of Electricity		Contracting, etc., account % of Turnover	
	Overall d/unit sold	Running charge in BST d/unit	Indirect costs	Surplus
London	**1·253**	**0·675**	**15·4**	**5·9**
	1·293	0·671	14·8	9·6
S. Eastern	**1·182**	**0·642**	**17·8**	**7·2**
	1·238	0·642	14·5	11·0
Southern	**1·088**	**0·579**	**19·0**	**6·8**
	1·163	0·595	15·4	10·7
S. Western	**1·115**	**0·636**	**18·6**	**5·8**
	1·129	0·624	15·8	8·8
Eastern	**1·125**	**0·617**	**19·8**	**4·8**
	1·169	0·614	15·5	9·1
E. Midlands	**1·014**	**0·540**	**17·4**	**5·8**
	1·014	0·515	14·0	9·5
Midlands	**1·061**	**0·589**	**20·8**	**4·4**
	1·052	0·563	15·8	8·9
S. Wales	**0·924**	**0·579**	**21·0**	**2·2**
	0·883	0·534	17·7	6·1
M. & N. Wales ...	**0·993**	**0·571**	**17·6**	**5·6**
	0·984	0·558	14·0	9·6
Yorkshire	**0·949**	**0·506**	**16·8**	**6·8**
	0·914	0·469	14·1	9·7
N. Eastern	**0·961**	**0·536**	**14·0**	**7·8**
	0·981	0·545	10·1	12·0
N. Western	**1·058**	**0·588**	**17·8**	**6·1**
	1·053	0·563	14·4	9·2

1960-61 figures bold; 1959-60 ordinary type.

copper concentric neutral; three-core solid aluminium with stranded aluminium concentric neutral; and four-core copper with single wire armouring.

Investigations into the installation and safe current loading of cables have continued in several boards. EEB are particularly active, and report that from work with varied soil conditions it is becoming clear that soil conditions have an important effect on the power carrying capacity of cables. LEB have continued experiments to determine the effect of high cable loadings on movement of moisture in soils. Transformer rating experiments are continuing in the south west, and SWEB report that initial results confirm the practicability of carrying loads well above name plate rating.

A problem for the supply industry generally is the effect of fluctuating industrial loads on other consumers. Arc furnaces, welding installations and the like cause the trouble. YEB have been experimenting with a transductor operating as three variable shunt reactors across a 500 kVA arc furnace. The aim is to control the transductor so that the reactive power demand is kept constant despite very rapid fluctuations in the furnace demand. Considerable success is reported, but the conditions for elimination of the visual effect of voltage fluctuation have proved more onerous than expected.

Turning to the utilisation side of research and development, an investigation carried out by the EEB stands out in interest. Printometers at 50 substations supplying 20,000 domestic consumers provided a check on their consumption. The results showed that at the time of area peak demand (5 to 5.30) average after-diversity domestic demand was 0·67 kW. This rose to about 0·7 kW at 7 p.m.

Table 3. Rural Electrification Progress

Area Board	Number of farms in Area	% connected at 31 Mar. 1961	Average consumption per farm consumer kWh
London	82	100·0	6,524
South Eastern	14,400	83·6	10,273
Southern	25,776	90·6	10,752
South Western ...	32,250	69·0	6,409
Eastern	31,600	86·7	8,558
East Midlands	27,900	93·1	8,688
Midlands	26,600	87·4	8,343
South Wales	23,500	70·8	4,480
Merseyside & N. Wales	34,120	75·4	4,483
Yorkshire	21,291	95·7	7,262
North Eastern	18,838	85·8	5,657
North Western ...	24,669	89·7	8,243
England and Wales ...	281,026	83·8	7,617

Another important conclusion from this work is that the average load factor of the domestic consumer at the time of peak was about 39%, or worse than the area load factor (Table 1). Within reasonable limits, domestic consumers seem to take 0·3 kW ADMD for every 1,000 kWh they use in a year.

SWEB have carried out tests on off-peak heating of water for handbasins having spray taps. MEB have continued their extensive work in advising industry on electro-heat, while MNWEB laboratories have designed a special type of storage heater to be used for circulating hot air for house warming.

Operations

1960-61 produced only a few floods as natural hazards complicating operation of distribution systems. However, in the districts involved these called for sustained efforts on the part of engineering staffs. The S. Wales EB report that the December flooding gave rise to the outstanding achievement of the planning, construction and energising of half a mile of 33 kV o.h. line in less than 25 hours, in order to restore supply to a colliery. SEEB remark that, during floods around Lewes, several l.p. feeder pillars operated for days with water completely submerging all three busbars. In the SWEB, apart from the immediate effects of floods, there was a delay on rural electrification programme because construction teams had to be diverted to help breakdown gangs. Boards with rural areas also suffered delays in their work because of movement restrictions associated with outbreaks of foot and mouth disease; MNWEB make special mention of this.

Several boards record fault statistics. SEEB had the lowest number of faults since 1955-56 at 2,937. Average consumer hours lost per fault fell to 517 from 549 in the previous year, while operation of auto-reclosing breakers limited the duration of each of 24 faults on the 33 kV system to two minutes. On the SWEB system there was a 6% decrease in faults on the h.v. system. Average loss of supply per consumer fell from 2·01 to 1·95 hours over the year. Faults attributable to lightning rose from 37% to 40%. On the YEB system, lightning caused 1,000 faults. Out of 2,444 faults altogether, 213 occurred at 22 kV and above.

The NEEB system had a difficult operational situation to face following trouble at the CEGB Blyth generating station. Provision was made for load shedding, but this did not prove necessary. The Board have carried out a five-year analysis of faults, which showed that 63% occurred on the overhead system, 53% are attributable to lightning. More than 74% of all faults on the h.v. system were transient, not necessitating repairs. This cannot be said of 88 supply interruptions experienced by the NWEB due to h.v. underground cables being damaged by mechanical excavators!

Commercial

Varied commercial activities of the boards receive much detailed comment in the reports. There are occasional highlights of national interest, such as the LEB remark that a request from BBC and ITA led to a permanent supply for TV equipment being provided in Trafalgar Square, and the SWEB statement that the Board supports resale price maintenance by manufacturers because it allows a reasonable profit, so that traders may provide facilities that are necessary to safeguard the long-term public interest. The magnitude of expansion of sales is underlined in one of the district reports accompanying the SEEB report. In Croydon, it says, almost every big departmental store has been rebuilt during the last two years and has increased its electrical load almost fivefold. In the main shopping centre of this near-London town, at least one shop in four has been completely rebuilt.

Attention to service centres has been widespread. EMEB report increased emphasis on improved standards of display, with a new window layout being provided for all centres every month of the year. S. Wales EB note an increased tendency for consumers to use the larger showrooms, and the Board are in consequence concentrating selling in the larger centres of population, shutting down some of their smaller showrooms. EEB have inaugurated a vigorous programme of showroom improvement based on modern style shop fronts, aimed at establishing the identity of EEB premises. SEEB report that cooker sales show over 56% of cookers fitted with automatic timing, compared with 43% in the previous year. A SEB survey notes that 48% of new houses connected during the year use electricity for cooking, and 61% for water heating, as against 45% and 55% in the previous year. An EMEB sample survey shows electric cooker users to total 35% of domestic consumers, washing machines 50%, refrigerators 18%, television sets 83%. Comparative figures obtained five years ago are 28%, 20%, 6% and 43%.

Costs of connecting consumers are discussed by the S. Wales EB. They estimate that average cost for underground supplies to a new housing estate is £80/house. A connection charge of £30 is made (£20 for overhead supply) where neither cooking, water heating nor space heating may be electric. There is no charge if there is freedom of choice for all these, plus a minimum standard of wiring; £15 of the connection charge is associated with the minimum wiring installation, £5 for cooker, water and space heating facilities.

Off-peak Supplies

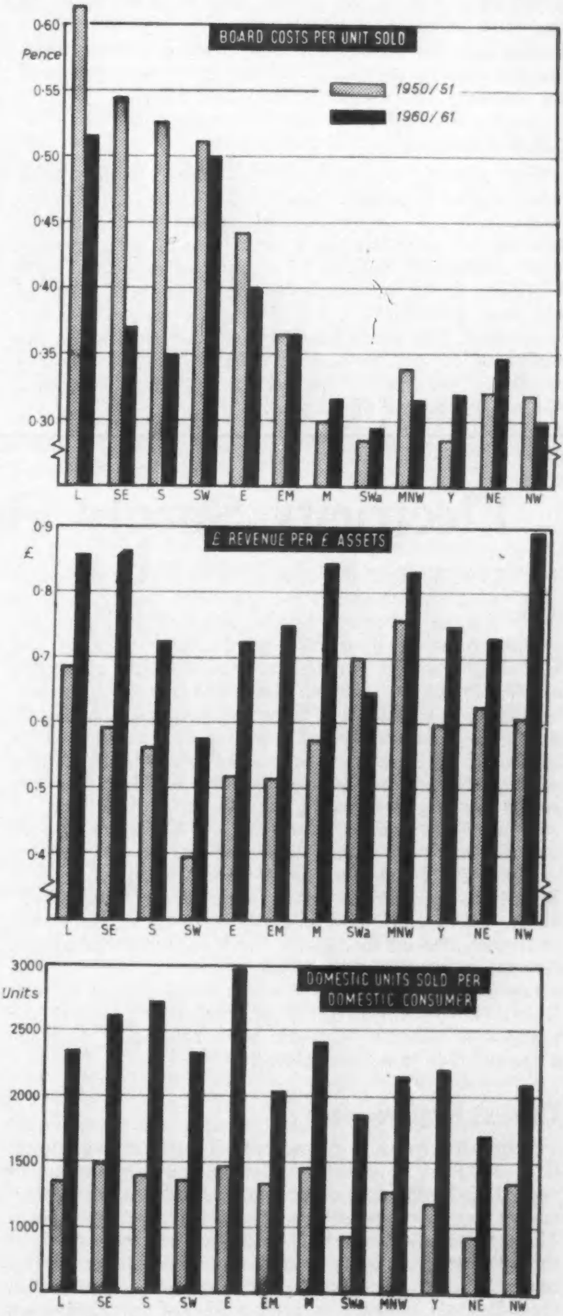
Success in developing off-peak supplies is widespread, the reports make clear. LEB speak of over 3,500 dwellings having floor-warming being supplied, almost three times the number at the beginning of the year; 8,000 dwellings are under construction with this form of heating. SEEB have 37·2 MW off-peak heat connected, including 9·7 MW connected during the year. SEB report 25% increase in capacity supplied under o.p. tariffs, with the total 160 MW, while the EEB added 25 MW during the year. SWEB total is 8·1 MW for floor and block storage heating connected during the year, including 3 MW in Board premises.

From EMEB comes a report of o.p. load increased by 20 MW to 53 MW, while the MEB connected 21 MW on o.p. tariffs during the year, bringing the total to 87 MW. YEB added 43 MW to total of 159 MW, 12 MW of the increase being for floor-warming, 6·3 MW block storage heating and 9·6 MW other forms of heating. NEEB speak of 3·3 MW block storage heaters and 2·5 MW of floor-warming connected during the year. NWEB note more than 10,000 floor-warmed dwellings occupied, under construction or programmed in their area.

Away from statistics, there is evidence of work to make off-peak loads more attractive. SEB are experimenting with centralised control instead of individual time switches. The same Board are attempting to persuade developers to use larger water storage tanks in blocks of multi-storey flats so that electric water heating can be more conveniently arranged. EEB report design work on a domestic storage heater and a temperature controller, while a new technique for fault finding in floor-warming installations has been developed by one of the Board's engineers.

Rural

Table 3 shows the progress made with farm electrification which went well during the year. Particularly notable was the launching of the EEB plan to complete practical electrification. SWEB speak of the 85% rural electrification target being reached by 1964, three years earlier than originally planned in the area. However,



Ten year comparison on area board performance. Board costs per unit sold include all costs other than purchase of electricity. £ revenue per £ assets include rentals and surplus on trading; assets are taken at book value. In calculating domestic units per domestic consumer, the year-end figure for consumers was used detailed figures for 12 typical farm schemes have shown that it takes three years to reach 90% of the anticipated revenue. Although average revenue per farm has doubled in the last seven years to £47/year, it is still below the economic level.

S. Wales EB have revised terms for connection of rural premises with guaranteed revenue to be restricted to six times the figure related to primary and secondary unit estimates in farms, any excess requirements being treated as a capital contribution payable over a period of up to five years. MNWEB met difficulty in planning rural electrification schemes due to uncertainty whether some properties had become derelict. It did not prove easy to obtain the necessary information in individual cases.

Administration

Staff training is mentioned by several boards. EEB report 1,450 interviews directed at obtaining periodic estimates of the potential of existing staff. It is estimated that over the next five years some form of staff development training will need to be undertaken by nearly 1,000 employees. EMEB have surveyed engineering staff positions and have prepared a ten-year plan to ensure adequate recruitment. The Board has started a scheme to widen the experience of staff, to help fit them for greater responsibilities; 110 applications for entry to the scheme had been received by the end of the year.

Changes in organisation are discussed by some boards, notably SWEB, for whom 1960-61 was the first year since abolition of sub-area. The Board reviewed the relationship between group services and districts and found that this review "endorsed the positive supervisory duties of group officers." EMEB reallocated the duties of three assistant chief engineers following appointment of a deputy chief. This change resulted in the assistant chief engineer (technical) being able to devote more time to standardisation of engineering materials. MEB reviewed organisation and decided that the existing arrangement of board-sub-area-district was the best. However, they reduced the number of sub-areas (now called areas) and districts. This Board have decided to produce overall organisational plans for a period of ten years ahead.

Consultative Councils

Activity by the consultative councils, quite apart from considerations of tariff changes, was particularly strong in 1960-61 to judge by the reports accompanying the area board reports. Complaints of low voltage were on the increase, although usually it was found that the board concerned had the matter in hand. Several councils took an active part in pressing local authorities to be helpful about substation sites. One (NW) called for higher reconnection charges when consumers had not paid their electricity bill and had been cut off.

Electricity Supply Finance

A FEATURE of the coming Parliamentary session of vital importance to the electricity supply industry will be a request by the Minister of Power for permission to increase the borrowing powers of the Electricity Council from their present limit of £1,800 million to £2,300 million. Last time borrowing power legislation was before the House of Commons, much turmoil was generated by MP's with a declared interest in tightening Parliamentary control of spending by central government and nationalised industries. This time the supply industry is preparing the way carefully.

In last week's annual reports of the Electricity Council and the boards, considerable space is devoted to the discussion of the industry's need for more capital, and to what it is doing about raising some of the money itself. Mr R. S. Edwards, chairman-designate of the EC, remarked in commenting on the reports that the Council had always thought of its 1958 publication, "Power for the Future," as the prospectus against which it raised money; as such it had to be honoured. That publication pledged the industry to increase its degree of self-financing considerably, and this is being achieved.

Capital Requirements

Before the question of sources of capital are discussed, it is necessary to decide on how much is going to be needed and when it will be required. Much fresh information on these matters is given in the recent reports. The starting point can well be the experience of the last three financial years, up to the end of last March. In this respect, Table 1 compares estimates and performance. Overall totals are seen to agree well, but the distribution of spending within those totals has changed appreciably.

CEGB requirements in the period were 5% higher than the forecast. About half of this was due to cost increases, notably in wages. The rest was the consequence of greater power station construction. This second factor deserves attention, for it introduces an uncertainty in any planning. A difficulty that is particularly intractable at present is that of determining how much to allow for progress payments in any year, especially with nuclear stations where experience is limited. Instead of an estimated £129 million, a total of £149 million was spent under this heading in the years 1958-61. Again, if plant manufacturers become short of orders they make faster progress on CEGB contracts than expected. Added to this is the need to revise plant commissioning programmes as the rate of growth of demand for electricity becomes more accurately known.

Table 1. 1958 Estimates and Today's for Capital Requirements

	April 1958-Mar. 1961		April 1961-Mar. 1965	
	1958 Est.	Actual spending	1958 Est.	1961 Est.
	£m	£m	£m	£m
Fixed assets—CEGB	557	585	830	947
Fixed assets—Area Boards ...	263	279	401	480
Nuclear Fuel—initial charge ...	27	9	68	52
Working capital variation ...	3	−29	−19	−7
Total Capital Requirments ...	850	844	1,280	1,472

Area board spending has risen above estimates by £16 million, half because of higher wages and prices. The rest of the increase is associated with extra work carried out. The EC report comments—and the reports of individual boards support this—that the amount of work carried out has been no more than necessary to keep up with new demand without falling behind in reinforcement of existing networks. "It has not, over the period as a whole, enabled them to make any significant inroad into arrears of work." Moreover, the Minister of Power has agreed to the higher spending indicated only on the understanding that this is so.

One of the major changes in the estimates has concerned working capital. This is reckoned as the difference between current assets on the one hand and current and deferred liabilities on the other. As more becomes due under large contracts, so the working capital figure tends to fall and with it the apparent requirements of the industry for capital.

Revised Estimates

Turning now to the future, to the four years 1961-62 to 1964-65, still bigger differences tend to appear between the predictions of late 1958 and 1961 reality. Table 1 again outlines the figures. Whereas the 1958 estimate of maximum demand in 1964-65 was 29,460 MW, the latest assessment is 33,200 MW—an increase of 3,740 MW. Moreover, the industry has decided that it should work on the assumption of a higher rate of increase than has been used in the past. Such considerations lead to an increase in capital requirements for both generating and area boards. Additionally, if it were possible, £80 million might be with advantage spent on improving existing area board networks to a satisfactory condition.

Besides taking into account such factors, the estimates in Table 1 have to make some allowance for changes in price. Offsetting these is the estimate that the average cost/kW of power station plant to be paid between 1961 and 1965 will, in fact, be about 10% lower than the average figure assumed in 1958.

Finding the Capital

There are two main sources of cash to pay for the capital work that has been discussed in preceding paragraphs. The money can come from loans from the Ministry of Power, on which interest has to be paid; or it can be earned by the industry as income in excess of revenue expenditure. This excess may be in terms of the "surpluses" which figure in the annual accounts, or in terms of the depreciation provisions which recognise the wearing out of plant. Additionally, a certain amount of money becomes available to the supply industry through consumer's capital contributions towards costs of supply.

The proportion coming from within the industry is the "self-financing ratio" so often spoken about. It has been represented as present consumers paying for the future and as a forced loan by consumers which will save them paying interest in the years ahead, a saving that will be reflected in future tariffs.

In the 1958-61 period, 45·6% of capital spending has been self-financed. To meet the pledge in the 1958 estimate that an average of 48·6% self-financing will be achieved in the 1958-65 period, 50·3% of the 1961-65 capital spending will have to come from within the industry, no less than £741 million.

Should the electricity supply industry's customers be asked to bear this burden? The Electricity Council have considered this point at length and have decided that in present circumstances "the surpluses at which the industry has been aiming cannot be said to be too high."

But it seems possible that the consumer may have to pay still more. Earlier this year the Government published a White Paper on "the financial and economic obligations of the nationalised industries." Discussions about the implications of this are proceeding at present and it seems that an even higher degree of self-financing may be demanded. Sir Robertson King has estimated that the proportion may in fact be pushed up to about 55%.

Individual Boards

Overall self-financing proportions are in some ways misleading for an industry which consists of autonomous bodies. The degree of self-financing reached varies widely from board to board, as Table 2 shows. The amount of information on self-financing plans given in the individual area board reports varies, but is nowhere extensive. However, it is clear from the reports of the area consultative councils that this question has been considered at some length in discussing tariff changes.

Table 2. Capital Spending and Self-financing of Area Boards 1960-61

	£m	% Self-financed		£m	% Self-financed
London	8·36	100·0*	Midlands	9·09	66·8
South Eastern ...	7·85	53·7	South Wales	6·60	39·7
Southern	11·31	61·6	Merseyside & N.W. ...	7·21	51·1
South Western ...	5·22	56·0	Yorkshire	11·08	34·6
Eastern	11·93	87·0	North Eastern ...	7.74	61·7
East Midlands ...	8·32	58·8	North Western ...	8·28	70·9

* Plus surplus loaned to Electricity Council

Sir Robertson King, chairman of the Electricity Council, and Mr R. S. Edwards, his successor-designate, both reckon that area boards should be able to see the current financial year and the one following through without increases in tariffs. Two boards are likely to have to increase tariffs in 1962-63. However, 1963-64 will see general tariff increases to cover greater self-financing needs, even if there is no major change in costs such as might be occasioned by a major increase in coal prices.

CEGB self-financing is not discussed in Table 2. It amounted to the relatively low figure of 35·0%, which must of course be considered against the heavy capital programme of the Board, with no less than £193·8 million of new capital to find last year. With a deficit realised, it is notable that no less than 34% of finance came from depreciation provisions.

Bulk Supply Tariff

The deficit of the CEGB repays further attention, as an indication of how problems of bulk supply tariff design may move in its next adjustment. As at present framed, the BST assumes a certain pattern of demand and thus of generation. The running charge in the tariff is so calculated, Sir Christopher Hinton has explained, that it just covers the cost of generation if the assumed pattern is realised. System-wide average cost of generation will be higher in the winter when less efficient plant is in operation, lower in the summer.

All the margins for contingencies and surplus are placed in the maximum demand charge; which could better be called a fixed charge, since the tariff is worded to make area boards as a whole pay only for what the CEGB provides in capacity, not for what they demand in the particular circumstances of any one year.

Last year, the greater demand for energy meant that less efficient plant had to be run. Barking "A," for example, thermal efficiency about 10%, was scheduled to generate 15 million kWh; in the event, it generated 43 million kWh. Kearsley, with 18½% efficiency, was scheduled for 5 million kWh, but actually generated 62 million kWh. Thus the greater-than-expected demand brought higher costs and no commensurate recompense for the CEGB. Moreover, teething troubles and delayed commissioning increased unit costs as well. Sir Christopher estimated last week that the cost of a single modern set being out of action for a day is £4,000.

These considerations meant that the CEGB planned surplus was not achieved, and so its self-financing was less than expected. No clue has been given whether depreciation is likely to remain the overwhelming factor in CEGB self-financing, or whether the area board position, where net surplus may be half depreciation provisions, will be approached. What is certain, as the figures given earlier in this article imply, is that the industry has to work for a consolidated surplus of £60 million or more by 1965, against the £16 million recorded last year.

LIGHTING LONDON'S TRAFFIC ROUTES

THE Consultative Committee on the Lighting of Traffic Routes within the London Conurbation has now published its Final Report.* The Interim Report was covered on page 185 of the ELECTRICAL TIMES, 10 September, 1959.

Some 20 recommendations are made and summarised. The report calls for consultation between neighbouring authorities on new installations in boundary areas or on routes continuing into other areas and for more research to produce a better basis than lumen values for measuring the effectiveness of lighting in terms of visibility. On the subject of lighting levels, no traffic route should have less than 5,000 lumens/100 linear ft while, on heavy traffic routes it should be not less than 7,000 lumens/100 linear ft with a target figure of 10,000 in three years. The target figure for medium traffic routes should be 7,000 lumens/100 linear ft in three years.

The report also calls for uniformity in lighting-up and extinguishing times and for all traffic routes in Greater London to have all-night lighting. For fog or unusual darkness conditions, special controlled lighting should be installed at all busy points. Central mounting of lanterns should not be used except in exceptional circumstances, and the minimum height of light sources on traffic areas should be 25 ft. In certain conditions, wall-mounted fittings on the sides of buildings are to be recommended.

The lighting levels on each side of busy traffic routes should be graduated for approximately 50 yd and there should be no abrupt changes in lighting level anywhere. Lighting should not be reduced in shopping areas and traffic routes should always be better lit than parallel service roads with some control exerted over distracting shop and sign lighting on either side. While uniformity of lighting level is more important than uniformity in colour, there should be uniformity in both along specially defined routes. The committee reverses its opinions on cut-off lanterns in the preliminary report and now says that they can be effective in reducing glare. It also calls for immediate, if temporary, improvements in poorly lighted streets pending a properly planned installation at a later date.

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* "Final Report," published by the honorary secretary of the Consultative Committee, Mr B. H. Wilson, Town Clerk of Hampstead, Town Hall, Haverstock Hill, N.W.3.

Compression Terminals by the Mile

JUST over six years ago, largely on the strength of its first order for terminations from the British aircraft industry, the American company of Aircraft-Marine Products Inc. formed the British subsidiary and applied to the Board of Trade for permission to set up a factory here. The factory, at Port Glasgow, was opened in January, 1955, with a nucleus of American engineers and a sales office in Kingly St, just off Regent St, London. The total staff, including American personnel, was about 80 and, initially, only a part of the output and none of the tools were made here.

Last week the Secretary of State for Scotland, the Rt Hon John S. Maclay, officially opened a new factory, adjacent to the old one which has been disposed of, with a floor area of 60,000 sq ft fully equipped to meet the demand for the company's compression terminals and tools, all of which are now made in Britain by British labour and with a British executive and sales force. Such is the achievement over a few short years of a small and enthusiastic group who have introduced here new standards of terminations in every branch of electrical and electronic engineering.

A typical view along one of the power press bays in the new A-MP factory at Port Glasgow. The open layout is typical of the whole plant

At one end of the scale there are the small taper pin connections and components for printed circuits carrying low voltages and current; at the other there are heavy current compression terminals for railways and heavy electrical industry. The company also makes specialised components incorporating high quality connectors such as pin-boards for computers.

Aircraft-Marine Products (Great Britain) Ltd. is one of a group of companies distributed throughout the world with plants operating in France, Italy, Holland, West Germany, Canada, Australia, Puerto Rico and Japan, as well as Britain, all of which are in close liaison with each other and with the parent company at Harrisburg, Pennsylvania. In all, some 15,000 items are manufactured at rates which run into many millions a week. A large proportion are applied by special machines with a high rate of output, the terminations being fed from reels of stamped out metal—brass, phosphor bronze, copper, etc.—miles of which are produced weekly on high-speed presses in the new factory. A battery of these is shown.

Apart from the aircraft industry, which now uses A-MP terminations almost exclusively, domestic appliance and the motor-car industries are among the biggest users, in many cases having terminations specially designed and made for them. It has been claimed that, apart from the high and consistent standard of connection achieved, these compression terminals show remarkable savings in time and labour, making them the lowest-price "as fitted" terminations in industry.

Headquarters of the British company is now at Amplo House, Saffron Hill, Hatton Garden, London. The general manager and director is Mr G. H. J. Munro.

NOTES ON WIRING

BY MEGOHM

I NOTE that a British manufacturer has marketed a shuttered, universal socket suitable for British, American and Continental 5 A plugs used on electric razors, but it is stressed that these are not suitable for fixing in bathrooms. This was quite interesting to me, for only a few days ago a friend of mine returned from a Continental holiday and told me of his shaving problems abroad. Amongst his experiences was a combined strip-light and plug for the use of electric shavers. This was seen in three hotels and appeared to be quite well made but, of course, did not suit every type of razor.

Being a little bit old-fashioned, I still prefer the feel of a cold steel blade on my face and I can sit back and look at the problems met by users of electric shavers in an uncommitted mood. Many hotels in London have shaver sockets installed adjacent to wash basins in the bedrooms, and some of them look mighty dangerous to me. I have also seen some peculiar contraptions used in the home to accommodate the shaver.

Another matter of interest reported by my friend was an unusual arrangement in his hotel room. Underneath the switch controlling the room light was what looked like a bell push. On closer examination this proved to be a removable button holding in place a ceramic fuse carrier. Unfortunately my friend did not have time to investigate this too far and had to leave it at that. It seems to me that this might have been a local fuse to control the light; but the mystery will remain unsolved unless some reader has seen this and can offer an explanation.

Rewiring

I was asked a leading question the other evening by a gentleman who lives in a downstairs maisonnette which is wired in p.v.c. cables in the usual way, having the cables carried down to switches and sockets behind metal capping. The question I was asked was, how I would go about rewiring the premises when the existing wiring broke down! The construction of the floors of these particular maisonnettes is timber joists with wood flooring, the ceiling of the ground floor flat being plasterboard nailed to the joists. There is also an acoustic mat sited between the plasterboard and the joists.

Of course, the simplest way would be to lift the flooring up above, but I doubt if the tenant, or owner, of that flat would favour that procedure. I had a look around the place and, quite frankly, it would be a really difficult job—but a most interesting one. The type of job which gives ample scope for the clever electrician to show his skill. One of the main difficulties I could see was getting new cables down to the switch positions. The use of metal capping in such instances really makes things awkward. Of course, another problem would arise when cables had to be run at right angles across the joists, for it is a comparatively easy matter to get cable pulled in parallel to the joists.

The problem was still interesting enough when I returned home for me to start "poking around," as my own flat is somewhat similar to my friend's. Being in the process of doing a little decorating, I was in a position to investigate my own wiring. I satisfied myself beyond doubt that it was impossible to move the cable which was fixed behind the metal channel. This made me sit up and think, and I hastily cut out the channel, replaced it with a piece of conduit and made good. I now know that I can at least get new cables down to that switch!

Here, I feel, is something which ought to be tackled by some authority or other. There must be thousands of flats wired in this manner, and sooner or later, their owners will be faced with this problem. There is also a chance that a fault may occur before the life of the cable ends. Most of the new houses being built by speculative builders are so wired. I have already given my views on their ideas of wiring, but I hasten to add this fact to my views. I agree that such wiring is quite suitable for a house where the owner can have board's lifted to allow rewiring to be done. In flats that is not necessarily so.

I might add that I did not attempt to pull in a new cable attached to the end of the existing cable. One person I knew did try this and landed himself in real trouble.

Danger?

Taking advantage of the fine weather (we have had some in the South!) and a long standing invitation, I spent a week-end "roughing" it in a caravan. This was my first experience and I soon got used to the way of life but missed the convenience of flipping on a switch for my light, etc. Later on, when taking in the sea air, I came upon another camping site which supplied the caravan dwellers with the luxury of electricity. This appeared very nice until I started looking around!

One person had his washing hung on the overhead cables serving his caravan, another had a cooker which I thought was there to cook for everyone on the site! The main switch was equally suitable for cooking on! Some vans had television sets and I took this to mean that the supply to these vans was at normal mains voltage. Strange as it may seem, I could find no record of an accident having occurred. This rather amazed me for there were also electric fires standing in some of the vans.

On returning to my temporary home, I spoke to the owner of the site I was camping on and asked him why he did not lay on electric supplies to the vans around. The answer was that he had done so at one time but got worried because of all the points I mentioned earlier. He pointed out that once a van was connected up to the mains, the van owner could, near enough, carry out any alterations he wanted to do. Rather than have the worry of all this, the site owner kept to supplying a few street lights and lighting in the wash rooms. I found out that the site owner was not an engineer or had ever been remotely connected with the electrical industry but had just used his common sense and read up about the dangers of electricity. How refreshing to meet such a person.

Personalities *in the industry*

Mr F. French

Mr M. H. Barnes

Mr W. L. Bentley

Mr J. M. Hodge

Mr J. W. Warner

Mr F. French has been appointed director and general manager of Edmundsons Electrical Wholesalers Ltd. He joined the old Sloan Electrical Co. in 1926, and successively occupied the positions of assistant branch manager—Glasgow, accessories department manager—London, assistant sales manager, sales manager and director and general manager, until the Sloan Co. was amalgamated with Alliance Wholesale and Simpson Baker, to form Edmundsons Electrical Wholesalers Ltd., Mr French being appointed a director of the new company.

Mr K. G. Smith has this week become deputy secretary of the General Electric Co., while continuing as GEC pension fund secretary and investment manager. In addition, **Mr N. Poyner,** who was formerly deputy financial controller of the Viscose Division of Courtaulds Ltd., has this week joined GEC as chief cost accountant.

Dr Percy Dunsheath, C.B.E., M.A., D.ENG., LL.D., M.I.E.E., has retired as chairman of Convocation of London University, a post he has held for the past 12 years.

The South Wales Electricity Board have appointed **Mr J. Panton,** A.M.I.E.E., as assistant chief engineer (meters). He will assist the Board's chief engineer on all matters associated with energy metering and will also manage the new Central Meter Testing Station now under construction at Colchester Ave, Cardiff, where the repair and testing of all the Board's metering and ancillary equipment is to be undertaken (*ESH, page 129). For the past ten years Mr Panton has been meter engineer for the Southall sub-area of the Southern Electricity Board. He started his career in metering with Chamberlain and Hookham Ltd., and, after holding posts at Newport and St. Pancras, became a testing assistant at the Metropolitan Electric Supply Co.'s central meter testing station at Bayswater in 1938. Nine years later he was promoted to meter engineer in charge of that station, and was later associated with the planning and installation of a meter testing station (of which he ultimately took charge) for the London Electricity Board at Fulham.

Previously product sales manager, Home Laundry Department of the Simplex Electric Co. Ltd., **Mr Martyn H. Barnes,** M.S.M.A., has joined Denham and Morley Ltd. to manage its Heating Division (the latter firm are now to handle various heating devices, as we note on page 499). Prior to joining Simplex, Mr Barnes was sales manager of the Domestic Appliances Dept. of Ferranti Ltd.

District commercial engineer of the Spalding District of the East Midlands Electricity Board since 1948, **Mr W. L. Bentley** has been appointed to succeed **Mr H. L. Jones,** A.M.C.T., M.I.E.E., as commercial officer of the Derby and Burton sub-area, on the latter's retirement in November (*ESH, pages 115, 117). Educated at the Leicester College of Technology, Mr Bentley joined the Buckrose Light and Power Co. at Driffield in 1936 as consumers' engineer. Three years later he became district engineer with the Boston and District Electric Supply Co., a position he held till vesting date.

Three further appointments in the South Western Region of the CEGB are announced. **Mr R. C. Barrett,** F.C.A., F.C.I.S., becomes deputy Regional secretary, **Mr G. O. James,** A.M.I.E.E., M.B.I.M., is now personnel officer, and **Mr M. F. A. George,** M.I.P.R., is appointed public relations officer (*ESH, pages 60, 63). Mr Barrett was previously secretary of the South Western Division from 1948, after being assistant secretary to Christy Brothers and Co. and their associated electricity supply companies for 17 years. Mr James has been labour relations officer at the CEGB headquarters since 1958, and secretary to the Electricity Boards' members of the NJIC and secretary to the Board's members of the NJC (Building and Civil Engineering) Committee. Mr George was previously Press officer to the UKAEA.

Dr W. J. Bates, PH.D., B.SC., has left Bristol University to join R. and J. Beck Ltd. as chief engineer.

From M and C Switchgear Ltd. we hear that **Mr J. M. Hodge,** ASSOCIATE I.E.E., has now been appointed export manager, in addition to his present position of London office manager, and will operate from the Victoria St office. He has been with M and C Switchgear since 1939, initially as technical sales engineer. Earlier he had served with W. J. Furse and Co. and, for three years, with Walker, Sons and Co. at Colombo, Ceylon.

General manager of Alkaline Batteries Ltd. since 1946, **Mr J. W. Warner,** M.A., M.I.MECH.E., A.M.I.E.E., has now been appointed to the board of that company. Educated at Malvern and Clare College, Cambridge, he graduated in 1928 with honours in mechanical engineering. He received practical training with J. I. Thornycroft and Co., of Basingstoke, before joining the Anglo-Persian Oil Co. (now BP Ltd.) as refinery development engineer. In 1931 he joined Chloride Electrical Storage Co. and was appointed general manager for India.

Mr J. Land has been appointed chief estimator of the AEI Switchgear Division. He started with the Metrovick Switchgear Department in 1919, and transferred to

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**Denotes revision to the "Electricity Supply Handbook, 1961."*

the Inspection Department in 1923, but returned to the Switchgear Department in 1928, to work on the design and layout of h.v. switchgear. In 1934 he was appointed assistant chief switchgear estimator and later took on additional duties of cost investigation. Since 1953 he has been chief switchgear estimator.

Mr J. R. Gandy, A.M.I.E.E., is taking up a new appointment at the head office of the Hackbridge and Hewittic Electric Co. Ltd. at Hersham. His previous position as area manager in Merseyside, N. Wales and N.W. England to the company is being taken over by **Mr E. Hanson,** B.SC.TECH., A.M.I.E.E., who, until recently, was with the English Electric Co. Ltd. at Stafford and, prior to that, was for many years with Metropolitan-Vickers.

Mr J. F. King has been appointed a director of the Morgan Crucible Co. Ltd. He is managing director of one of its subsidiaries, Morgan Refractories.

Until recently manager of the Process Control Division of Constructors John Brown Ltd., **Mr D. Ambrose** has been appointed manager of the Southern Division of Fischer and Porter Ltd., operating from Harrow.

Dr D. S. Beard, PH.D., A.INST.P., A.R.C.S., B.SC., has been appointed to the board of Griffin and George Ltd. as technical sales director. He joined that organisation in 1960 from the Norwich City College, where he had been a lecturer in physics and mathematics.

We are now able to reproduce, below, the portrait of **Mr Arthur Bond,** L.M.T.P.I., COMP.I.E.E., whose appointment as the new chairman of the Yorkshire Electricity Board, to succeed Mr D. Bellamy on his retirement, we noted last week. Mr Bond assumes his new title on 25 Feb., 1962.

Last week-end brought the retirement of **Mr A. C. MacQueen,** A.H.W.C., M.I.E.E., from the position of Birmingham area engineer of the Midlands Electricity Board, which he has held since 1948, following 22 years' previous service on the engineering staff of the Birmingham Corporation Electric Supply Department. His successor is **Mr R. H. Rockliffe,** A.M.I.E.E., as we have previously reported (*ESH, page 125). Mr MacQueen started on the engineering staff of the Ayrshire Electricity Board, and in 1924 joined the BTH Co., Rugby, where he was engaged on the testing of plant. He began his long association with the Birmingham undertaking in 1926, initially in the Meter Department, and subsequently held progressive posts as assistant district engineer, design and development engineer, assistant mains engineer, deputy mains engineer and deputy distribution engineer. He was engaged in the changeover of the h.v. distribution system from 25 cycles, 5·5 kV to 50 cycles, 11 kV and also launched the programme of changeover of the medium voltage system from d.c. to a.c., completed last year. In 1945 he supervised the design and installation of the first 132 kV transmission system to be established by a municipal undertaking. Other technical developments for which he was responsible included temperature loading of plant and cables, and a system of automatic restoration of supply. Latterly Mr MacQueen has supervised the construction of several MEB depots in Birmingham and the reconstruction of the Board's premises in Summer La.

Until recently southern branch manager with Hoover Ltd., **Mr C. F. Needham** has retired after 33 years' service.

Mr G. Cunliffe, managing director of Norcros Ltd., has been elected president of the British Standards Institution and as chairman of the General Council. **Mr A. D. Bonham-Carter,** UK co-ordinating director of Unilever Ltd., succeeds Mr Cunliffe as chairman of BSI's Finance Committee, and **Sir Anthony H. M. Bowlby** has been appointed chairman of the Engineering Divisional Council in succession to Sir Stanley Rawson, whose term of office has expired.

Under a reorganisation of its distribution areas the Trinidad and Tobago Electricity Commission have made three appointments. **Mr G. O. A. Ford,** A.M.I.E.E., is in charge of the Northern distribution area, which includes Port of Spain; **Mr K. J. Taylor,** A.M.I.E.E., succeeds him in San Fernando as manager of the Southern distribution area; and **Mr R. E. K. Inniss,** B.ENG., A.M.I.E.E., is appointed manager of the Eastern distribution area. Mr Inniss, who was formerly distribution engineer and acting general manager of the recently amalgamated Port of Spain Corporation Electricity Board, has been on long leave in the UK and Canada, and takes up his new duties next month. Mr Ford was an engineering graduate of Cardiff Technical College and joined the Commission in 1950 as a shift engineer. Mr Taylor joined the Commission's staff in 1956 and has been area engineer, north, since 1959.

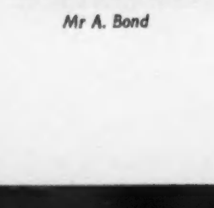
Managing director of the Revo Electric Co. for the past four years, **Mr W. H. Rigg,** B.SC., has this week joined Firth Cleveland Tools Ltd. as managing director. Educated at Malvern College, Worcestershire, he studied at the City and Guilds College and began his career as an engineering student with W. H. Allen Sons and Co. After gaining experience in production engineering with several other firms he joined Vono Ltd., of Tipton, as production manager in 1937, became works manager two years later, then a director in 1941, and acting managing director in 1942 at the age of 29. At that time he also became a director of Duport Foundries Ltd., which with Vono Ltd., subsequently merged in the present Duport group. After the war he started out as an engineering consultant, but in 1951 accepted an offer to join Vono Industrial Products Ltd. (now known as Duport) Ltd., as chief engineer, and two years later took over direction of his former position with Vono Ltd., subsequently being appointed director and assistant managing director. In the transitional period while Revo Electric Co. was being acquired by the Duport group, he reorganised the structure of the company as works director, and was appointed managing director in 1957.

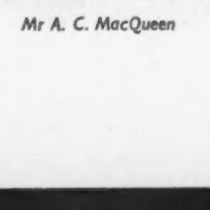
At present deputy managing director of the Marine Division of Richardsons, Westgarth and Co., **Mr H. Kay,** B.SC., M.I.MECH.E., has been appointed assistant managing director of the Engineering Division of Tube Investments Ltd.

We understand from **Mr David G. Lindsay,** A.M.I.E.E., DIPL.R.T.C., that he has terminated his association with Alexander Lindsay Ltd. and Lindsay Television and Radio Ltd., of Glasgow, and is now sole partner in the firm of D. G. Lindsay and Associates, consulting engineers.

Sir John Dean, B.SC., F.I.R.I., A.R.I.C., has retired from the board of British Insulated Callender's Cables Ltd., and certain subsidiaries, in order to devote his time to the chairmanship of Submarine Cables Ltd.

Mr J. N. Wilkinson has been appointed a joint managing director of


Mr A. Bond


Mr A. C. MacQueen

Mr W. H. Rigg

Telefusion Ltd., together with Mr J. C. Wilkinson, chairman and managing director.

Mr R. S. Medlock, B.SC., A.R.I.C., A.M.I.E.E., A.M.I.MECH.E., and **Mr R. V. May,** mechanical meter marketing executive, of George Kent Ltd., are now on overseas visits—Mr Medlock in South Africa and Mr May in South America.

The end of last month brought the retirement of **Mr G. W. Griffin,** M.B.E., F.B.I.M., director of manufacture on the board of AEI (Woolwich) Ltd. His retirement was marked by a number of presentations from colleagues and business associates. From his fellow-members of the Woolwich board he received a TV receiver, presented by Dr J. N. Aldington. An oil painting of the "Cutty Sark" was the gift of directors of Submarine Cables Ltd., a silver salver, serviette rings and an album were subscribed by the workpeople, and he received a silver fruit dish from the senior executives of AEI Cable and Telecommunications Division. Mr Griffin started with the Pirelli-General Cable Works in 1915 where he rose to chief of Engineering, Maintenance and Factory Construction Departments. He joined Siemens Brothers and Co. at Woolwich in 1939 as assistant cable works manager, was promoted to cable works manager in 1940, to general works manager at Woolwich in 1942 and was later responsible for the establishment of Siemens Bros. factories at Spennymoor and Hartlepool. He became a director in December, 1947, and has remained a director on the subsequently formed companies of Siemens Edison Swan Ltd. and AEI (Woolwich) Ltd. During the war he was a member of the team which evolved the prototype cable for PLUTO.

Mr K. H. Vernon has been appointed lamp and lighting representative for North Wales under the Liverpool branch of Philips Electrical Ltd. He succeeds **Mr G. T. Jones,** who is now branch manager at Liverpool.

The former chairman of the Federal Power Board of Rhodesia and Nyasaland, **Sir Duncan Anderson,** who was in charge of the Kariba project, has now become the first chairman of the New Towns Commission in Britain.

Dr J. W. Menter, M.A., SC.D., F.INST.P., has been appointed director of the Tube Investment Research Laboratory at Hinxton Hall, near Cambridge, where fundamental research in metal physics and physical metallurgy is carried out.

Formerly assistant engineer-in-charge, **Mr L. G. F. Shuttleworth** has been promoted to engineer-in-charge of the Tatsfield Receiving and Measurement Station of the BBC in succession to the late Mr H. V. Griffiths.

Mr J. G. Wellings, M.I.E.E., has retired from his post of instrument transformers consultant in the AEI Transformer Division at the Rugby works after 46 years' service, and has been presented with a number of parting gifts. Mr Wellings has served on numerous BEAMA, BSI and IEC committees and was also a member for several years of the old Electric Discharge Lamp Auxiliaries Council's Technical committee, as well as participating in the meetings of CIGRE in Paris, and travelling widely for the company.

Mr Ronald F. Russ has been appointed director and general manager of Consolidated Electrodynamics Corporation (UK) Ltd., the formation of which we referred to last week.

Technical manager to Brentford Transformers Ltd. since last April, **Mr M. G. J. Fry,** B.SC., A.M.I.E.E., has been appointed technical director of the company. He was formerly, for 11 years, with the Grantham firm of British Manufacture and Research Co. until the end of 1960 when he resigned his post of chief engineer.

Sir Willis Jackson, F.R.S., D.SC., D.PH., D.SC.(ENG.), M.I.E.E., M.I.MECH.E., F.INST.P., F.I.R.E., who since 1953 has been Director of Research and Education to Associated Electrical Industries (Manchester) Ltd., relinquished that appointment at the end of September to return to academic life as Professor of Electrical Engineering at Imperial College, University of London. He has also just been appointed a member of the Government's Advisory Council on Scientific Policy for the period ending 31 July, 1964. His successor as Director of the AEI Research Laboratory, Manchester, is **Dr J. M. Dodds,** O.B.E., M.A., B.SC., who last week presented a canteen of cutlery to Sir Willis on behalf of the members of the laboratory. Subsequently further presentations were made to Sir Willis from members and ex-members of the AEI Manchester Education Department. Dr Dodds has been manager of the Research Laboratory since 1957, having started as a physicist in the Radio Section back in 1933.

New deputy chief engineer of the Midlands Electricity Board is to be **Mr G. F. Slade,** B.SC., M.I.E.E., who will succeed **Mr R. A. York,** B.SC., M.I.E.E., on 1 Nov. Mr Slade, who is 45, was educated at Handsworth Grammar School, Birmingham, and at the University of Birmingham, and joined the Supply Industry with the Midland Electric Corporation. He was district engineer at Bilston from 1938 to 1941. After service with the Royal Navy he returned to the Midland Electric Corporation as maintenance and public lighting engineer. On nationalisation he was appointed maintenance engineer for the South Staffordshire and North Worcestershire sub-area, becoming sub-area constructional engineer in 1951, and moving to headquarters as assistant chief engineer (distribution) in 1954 (*ESH, page 121).

OBITUARY

Mr W. Foxen, senior construction and operations engineer to the Eastern Electricity Board in the Norwich district, has died, aged 54.

Mr H. Rigby, a director of L. G. Hawkins and Co. Ltd., died on 26 Sept.

Mr C. M. Vignoles, chairman of Evershed and Vignoles Ltd., died recently, aged 60.

Mr F. C. Sellens, A.M.I.E.E., who was generation engineer (construction) with the London Division of the BEA until retiring in July, 1949, died on 27 Sept., aged 78. Previously he had served with the County of London Electric Supply Co. from 1904, during which time he was concerned with construction work at Barking power station, where he became turbine house superintendent in 1924. He was promoted to deputy generating engineer to the company in 1936, and became advisory engineer in 1945.

Mr R. S. Wright, M.I.E.E., formerly managing director of Newton and Wright Ltd., died on 1 Oct., aged 85.

Mr Albert Henry Midgley, M.I.E.E., who died on 1 Oct., aged 79, had, in latter years, acted as a consulting engineer but was a prolific inventor, and evolved the first motor-car lighting and starting equipment with his dynamo in 1909. He was chief engineer of CAV Ltd. for many years, and had also been associated with J. Stone and Co. Ltd., in their train lighting activities, and was founder of MCL and Repetition Ltd. He was also a director, up to the time of his death, of Midley, Harmer Ltd., which had been formed to deal with the development of some of his inventions.

Mr R. Ditchburn, manager of Charles Ramsay and Son, electrical contractors of South Shields, has died, aged 58.

BOOKS RECEIVED

Static Fields in Electricity and Magnetism, by D. H. Trevena. Text book for sixth form or pass degree students. Published by Butterworth, 255 pages, 8½ in. by 5½ in. Price 35s.

A High-Temperature Linear Rise Calorimeter for Measuring Stored Energy in Irradiated Graphite, by D. F. Davidson and others. UKAEA TRG Report 53 (CA), obtainable from HMSO, price 3s 6d.

FTD2—A 2-Dimensional Flux and Temperature Distribution Programme for Thermal Reactors, by J. A. Enderby. Programme for electronic computer calculation. UKAEA Report TRG 46 (R), obtainable from HMSO, price 3s.

Road users and street lighting

DO PEDESTRIANS RECEIVE DUE CONSIDERATION?

SO much is written and said about the motorist and road safety in relation to public lighting that one is inclined to forget that he is, at least for the present, a minority user of our highways and byways. It was, therefore, refreshing to hear Mr E. C. Lennox, this year's president of the Association of Public Lighting Engineers, in his opening address at the Scarborough Conference, remind listeners that the pedestrian, too, had a point of view to consider.

The pedestrian, he said, has usually completed a heavy day at work, and is entitled to consideration in walking out with a companion whose features and dress should be seen in reasonable or even complimentary colour rendering and not appear to be dressed in drab material and having yellow or colourless features, which makes one appear to be even more tired than one feels.

Thus do pedestrians suffer in the name of efficiency! The harmonious social use of streets at night is lost for one or two decades for a very small cost difference. Why do they not complain? Valuable as the work of the Royal Fine Arts Commission and Council of Industrial Design has been in helping to improve the aesthetic value of the columns and lanterns, surely the moral uplift of appreciative colour distinction at night is at least of equal aesthetic value. Yet the voices of these bodies is hardly ever raised against the destruction of colour values during the dark hours in areas used predominantly by pedestrians.

Progress of the A.P.L.E.

Mr Lennox, who was elected president for the second time this year, summarised the changes which had taken place, both in the Association and in general lighting practices, in the intervening 25 years since he last held the office. Membership, which was 60 when he joined in 1924 and had risen to 372 when he was last elected president, now stood at 680. In the same measure, the attendance and interest in the annual conferences had also increased the 300 delegates from 140 local authorities in 1936 comparing with the 842 from 345 local authorities present this year. In the same period there have been tremendous changes, both in the light sources available to the public lighting engineer and in the techniques of application; and one of the most noteworthy points was that, whereas gas lighting had shown very little advance in efficiency as determined by lumen output per therm of gas consumed, electrical light sources had progressed enormously. As a result, today gas lighting remained on only about 10% of our public highways whereas electrical sources shared the balance in the proportions of 28% tungsten filament, 17% mercury vapour, 38% sodium and 7% fluorescent.

The high proportion of tungsten filament lighting is to be found in residential areas where lower mounting heights (15 ft) demands the use of lower rated lamps.

In regard to electric discharge lamps, though the high pressure mercury vapour types have been in use since 1933 and the efficiency increased, and the even more efficient sodium vapour lamp has reached, in linear form, efficiencies of 100 lumens/W, making it the preferred choice for ring roads and outer traffic routes, both sources leave much to be desired in correct colour rendering. The introduction of fluorescent powders into the outer envelopes of the h.p.m.v. lamp has gone some distance in improving the colour rendering and has great possibilities in central residential areas, city squares and similar places largely populated by pedestrians.

The tungsten/iodine lamp is now past the experimental stage and can be used for projectors and floodlights. It could also be used as ballast lamps for the discharge types still further improving colour rendering at small loss in overall efficiency. There is still room for improvement in all light sources.

Lighting Costs

As to the cost of running, electricity is up 46% on 1936 figures, or 32% on the 1949 costs, but if we take into account the greatly increased efficiency of present day light sources to set against cost of living and wages, some 300% up, relatively speaking light is cheaper than pre-war.

Fluorescent lighting had not proved so easy to control as regards distribution and housing the relatively long light sources but, where they had been used, the colour rendering and general appearance of the surroundings were as good as any system yet introduced and running and replacement costs were extremely low.

Mr Lennox then reviewed the many papers, dating back to 1935, on the subjects of road lighting and safety, costs, administration and the current demand for lighting on the main motorways. He foretold many changes for the future with even better light sources and better forms of administration and asserted that, in his opinion, the Association had an important function to perform which he was confident they would exercise with benefit both to themselves and all road users.

Public Lighting and Obsolescence

On Tuesday afternoon, Mr H. Hewitt presented his paper, a comparative survey of lamps used out-of-doors, which served to highlight many of the points in the presidential address. He opened by saying that obsolescence is an inevitable part of progress and we all knew the feeling of disappointment when, having bought an article only a year or so ago, we find it outdated by something new. Such disappointment is unavoidable but, in so far as it concerns public lighting expenditure, it can be mitigated to some extent if we try to anticipate some of the developments which are taking place in light sources and see how we could have used the lamps available a very short time ago to better advantage.

On the previous conference at which he spoke in 1957, he and his colleague, Mr R. Stevens, had tried to look beyond the existing Code of Practice. Now the bogy of obsolescence had struck the Code as well and we were awaiting, with varying degrees of patience, the issue of the revised Code. Without attempting to anticipate its recommendations, he proposed to confine himself to a survey, on a comparative basis, of existing and pending light sources.

Opening with the well-known analysis of costs in operation and its many variants, he made the point that the light output of the lamp itself was not enough in such an analysis since the only part of the light which was useful was that distributed below the horizontal. This was partly the function of the lantern but was also tied with the choice of light source.

Public Lighting and Glare

On the ever important question of glare, we must remember that it cannot be assumed that because a lamp has a low brightness it will not cause glare, or that because it has a high brightness it will cause glare. The observed area is also a factor. A good lantern can utilise a high brightness source and give both adequate distribution and freedom from glare.

In regard to colour rendering, he felt that the general public had become reconciled to the use of sodium and uncorrected mercury vapour lamps on traffic routes and are prepared to put up with their inferior colour rendering in the interests of road safety. In surburban shopping areas, this might be due partly to the contribution made by the lights from shop windows, and in extreme cases, New York was quoted, the street lighting is almost unnoticed so great is the number of brilliantly lit windows from stores, shops and advertisement signs. It is, however, in the lighting of residential roads that the situation becomes puzzling for, despite the public's distate for poor colour rendering, sodium lamps are now acceptable and chosen by many local authorities. True, in some cases differences in lamp colours have been used to code the streets for easy route finding but, as we are finding it difficult to achieve even the first moves towards a uniformity of street lighting, what hope is there in reaching agreement on the general adoption of such a system?

Comparison of Costs

Mr Hewitt then proceeded to make a comparison of costs for different forms of street lighting, using as his basis the price to provide 1,000 lumens over a period of (a) 2,000 hours and (b) 4,000 hours. For this analysis he adopted four categories, the first of up to 3,500 lumens per point in residential roads and rural situations. The second, from 3,500 to 7,000 lumens/point caters for a range of minor roads. The third, 7,000 to 15,000 lumens/point is for main road lighting and the fourth, over 15,000 lumens, for new ideas in road building. These categories were tabulated as below.

Category 1

Lamp	Lumen Output	Annual cost/1,000 lumens	
		2,000 hrs	4,000 hrs
Tungsten 100 W	1,200	28s 10d	41s 11d
MBF/U 50 W	1,400	21s 10d	33s 10d
Tungsten 150 W	2,030	25s 3d	36s 8d
MCF/U 2 x 20 W	2,040	13s 6d	20s 4d
SO/H 45 W	2,250	20s 4d	32s 1d
MBF/U 80 W	2,600	17s 4d	26s 7d
Tungsten 200 W	2,810	24s 4d	35s 5d
MCF/U 2 x 2 ft 40 W	3,040	13s 8d	20s 2d
SOI/H 45 W	3,100	16s 1d	25s 9d
MCF/U 2 x 30 W	3,240	12s 3d	17s 11d
SO/H 60 W	3,420	15s 6d	21s 6d

In these areas the use of tungsten filament lamps cannot be justified, particularly in regard to high labour and replacement costs. A 50 W MHF/U lamp will do the job of a 100 W tungsten filament lamp more efficiently and cheaply. The fluorescent lamp, however, comes out the best and, in view of this it does appear surprising that sodium lamps, with their poorer colour rendering, have made such progress in minor roads.

Category 2

Lamp	Lumen Output	Annual cost/1,000 lumens	
		2,000 hrs	4,000 hrs
SO/H 60 W	3,420	15s 6d	21s 6d
SOI/H 60 W	4.700	12s 1d	19s 4d
MBF/U 125 W	4,700	13s 8d	20s 7d
MCF/U 2 x 40 W	5,120	9s 4d	13s 7d
SO/H 85 W	5,525	12s 1d	19s 4d
MCF/U 4 x 30 W	6,480	12s 3d	17s 11d

In this category integral sodium dominates the orthodox pattern at the lower end, while both the twin 30 W and 4 x 40 W fluorescent have lowest running costs providing only that the lantern cost can be reasonable.

Category 3

Lamp	Lumen Output	Annual cost/1,000 lumens	
		2,000 hrs	4,000 hrs
SOI/H 85 W	7,400	9s 5d	15s 0d
MA/V 250 W	8,750	12s 6d	18s 4d
SO/H 140 W	9,100	9s 11d	15s 5d
MB/U 250 W	10,000	11s 1d	16s 3d
MBF/U/250 W	10,500	11s 2d	16s 9d
SOI/H 140 W	12,200	7s 5d	11s 7d
MCF/U 3 x 80 W	13,920	8s 2d	11s 8d

Once again the orthodox 140 W sodium performance is poor, the 85 W integral giving better value for money. It is, however, interesting to speculate how the 3 x 80 W fluorescent tubes would fare if only lantern designers could solve the problem of manufacturing a satisfactory, economic lantern.

Category 4

Lamp	Lumen Output	Annual cost/1,000 lumens	
		2,000 hrs	4,000 hrs
MA/V 400 W	16,000	10s 2d	14s 9d
MB/U 400 W	17,000	9s 7d	13s 11d
MBF/U 400 W	18,000	10s 1d	15s 2d
Sodium lin. 200 W	18,400	6s 9d	10s 7d
SOI/H 200 W	20,000	6s 3d	9s 10d
SOI/H 280 W	22,400	8s 1d	12s 7d
MBF/U 700 W	32,000	9s 7d	14s 6d

Newer Light Sources

Looking ahead towards possible developments in the light of current development trends, in the fluorescent tube field, the high loaded 125 W 5 ft lamp, three to a lantern, and assuming that it could achieve a 5,000 hr life, is a good proposition economically. The use of green fluorescent tubes, with their very high efficiency for main roads (particularly in country areas) could also be economic.

There is, at the moment, a great deal of interest in the quartz iodine, tungsten filament lamp. Could this be used for public lighting? Even assuming that an efficiency of 25 lumens/W and a life of 2,000 hrs could be achieved, the economics for main road lighting would appear to be hopeless but a case for its use in side road lighting might be made out. The xenon arc lamp, which has been used on the continent for lighting public squares, requires bulky, expensive control gear and is not competitive with existing light sources in overall and running costs.

In floodlighting a number of new developments have promising possibilities. These include the low-voltage, crown silvered lamps in narrow angle projectors or in association with the Infranor system and a new aperture type fluorescent tube with a narrow window constituting a line source of brightness approaching 25,000 ft-lamberts.

The remaining papers and discussions on the above will appear next week.

Public lighting fittings and equipment

A.P.L.E. CONFERENCE EXHIBITION AT SCARBOROUGH

A vehicle-operated parking gate for self-parking areas by Venner Ltd.

THE exhibition which is a regular feature of the Association of Public Lighting Engineers' annual conference is again well supported this year with a number of new lanterns and lighting accessories.

New Lanterns

AEI LAMP AND LIGHTING on stands 23 and 24 are showing the latest from their range, the "Harrow," housing two 2 ft 40 W or 20 W fluorescent tubes specially designed for a Class B scheme now under way in Harrow, Middlesex, as well as additions to their established "Amberline" range for the 200 W sodium linear lamp and the M.30 floodlight. Side entry versions of the "Baby Amber" for Group B roads using 45 W to 60 W sodium lamps and a side entry 140 W for Group A roads, a new refractor version of the "Kington" lantern and the established "Carpenter" and "Kuwait" ranges are also shown.

ATLAS LIGHTING, on stand 9, are showing the "Alpha 7," an entirely new Group A lantern for 250 W or 400 W colour corrected MBF/U lamps. This incorporates a one-piece cast light-alloy body and Opticell refractor system. Another recent addition on view is the "Alpha 5" Group A sodium lantern for the 200 W linear lamp and yet another is the miniature weatherproof fluorescent bulkhead fitting with two 12 in. 8 W tubes and enclosed control gear.

On the HOLOPHANE stand the latest development is the "Hastings" wall mounting unit for 250 W and 400 W MBF/U lamps, which takes its place alongside the established "Acorn" mercury 400 W lanterns, "Bi-Way" bowl refractor units, post-top fittings and other well known Holophane developments.

VICTOR PRODUCTS are exhibiting their new cast aluminium alloy flush- or free-fitting unit housing two 2 ft 20 W fluorescent tubes as well as their well-known smaller bulkhead units.

Among the newer fittings on the ELECO stand (7) are the "Silver Ray" junior for 80 W or 125 W MBF/U lamps, the "Golden Ray" 200 and a particularly attractive slim lantern, the "Fluor-Ray Slim 80," designed for use with 5 ft 80 W reflector-type fluorescent tubes.

The GEC LIGHTING AND HEATING GROUP are also showing examples of their latest designs. They include the "Birmingham," a 250 W to 400 W MBF/U lantern with a true cut-off distribution, which is strictly in accordance with the recommendations of the 1951 Code of Practice for this type of lamp, the "Tees," a top entry Group B, and "Tyne," side entry Group B, for tungsten filament or MBF/U lamps.

The BERGO exhibit is mainly concerned with internally illuminated guard posts and fittings for subways, etc.

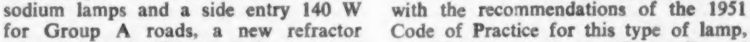
Timeswitches and Accessories

Three companies with established reputations for timeswitches are SANGAMO WESTON LTD. on stand 6, the HORSTMANN GEAR CO. on stand 15 and VENNER LTD. on stand 1. The latter company is also exhibiting parking meters of various types and is demonstrating a vehicle-operated parking gate which controls entrance to private or public car parks without the necessity of an attendant. Several schemes are possible, entry or exit being permissible by the introduction of a coin or pass key into the slot device, which releases the gate to permit passage of the vehicle, a pad-switch returning the gate to the closed position after it has passed. It will not rise if the car park is full.

The TELEPHONE MANUFACTURING CO. on stand 26 is showing, among other exhibits, a range of new capacitors for gaseous discharge lamps with better life, smaller dimensions and a novel fixing arrangement. GOWSHALL LTD. also show guard posts and island site lighting arrangements and a novel signlight which will accommodate either tungsten filament or fluorescent lamps.

Outside Exhibits

The outdoor displays on the Spa Access Rd, as usual, include a full selection of columns, both in steel and concrete, and tower wagons by the leading British manufacturers. The EDA display on stand 27 shows how the general standards of street lighting have developed over the past 25 years.



Four new lighting accessories from the exhibition: 1, the Holophane "Hastings" wall mounting lantern; 2, the new range of TMC Capacitors with novel fixing bracket; 3, the "Harrow," a new lantern in the AEI range; 4, an external sign illuminator by Gowshall Ltd.

A Simon hydraulic platform on public lighting maintenance in Kowloon, Hong Kong

new products and appliances

Cordless shaver is self-charging

IN answer to the recent popularity of battery-driven shavers, Remington have introduced a model with its own charging unit. Called "Lektronic," the shaver is imported from the United States and is said to require charging only once a week. The shaver stores energy in its nickel cadmium cells and works at full speed until the cells are exhausted. It is then placed on the charging unit which, connected to mains supply, recharges in about 12 hr. An automatic cut-out operates when the cells are fully charged. A pilot light is fitted to the charging unit and this operates when the cells are charging, but is not extinguished when they are charged. The unit is said to operate over a considerable range of a.c. voltages from 90 V to 250 V. The shaver itself resembles Remington's Roll-A-Matic and has 360 self-sharpening cutters. Shaver and charging unit, complete in a leather presentation case, costs £14 18s 6d including purchase tax. *Remington Electric Shaver Ltd., 26 Kensington High St, W.8.*

Transistor clip range extended

A FURTHER addition to their range of transistor clips has been made by Lewis Spring Co., with a series designed to suit cylindrical transistors. The clips will suit a range from 5·6 mm to 5·9 mm; 4·3 mm to 4·6 mm and 8·5 mm to 9·1 mm, and are for fixing horizontally to printed-circuit boards. Clips have been maufactured from beryllium copper and are available ex-stock. Soon to come on the market are a series of flute transistor clips in spring steel to suit diameters of 5 mm, 6 mm and 9 mm for "close to board" assemblies. *Lewis Spring Co. Ltd., Resilient Wks, Redditch.*

Cordless shaver from Remington

New range of thermostats

A RANGE of thermostats, said to have applications in industrial, commercial and domestic uses, has been announced by GEC. They are designed in such a way that base plates are not required and they can be mounted on walls or on BS conduit boxes. Said to be easy to read, the temperature scale indicator is protected by a window. Designated the "628" range, these thermostats give control from 40°F to 80°F with the exception of a special low range model giving control from 25°F to 65°F. Ratings are between 10 A and 20 A and the prices range from £2 15s to £3. *GEC Ltd., Magnet Hse, Kingsway, W.C.2.*

Pot-core assemblies

A NEW range of "Ferramic T" adjustable pot-core assemblies from the Plessey Chemical and Metallurgical Division comprises four units, with diameters of 14 mm, 18 mm, 22 mm and 26 mm, and respective permeability values of 63, 100, 160 and 220. Adjustment is by gap size, the range of adjustment being around 14% of the mean inductance. The smaller units are equipped with a six-pin base and bayonet fitting for use on a standard 0·1 in. printed board. Metal plate clamping assemblies are available for the 26 mm cores.

Close control of manufacturing processes and the use of exceptionally pure raw materials have resulted in a range of high-grade ferrites, covering a frequency spectrum of 1 kc/s to 2 Mc/s. The material characteristics include high initial permeability, very low losses and close tolerances in the temperature coefficient. *Plessey Co. Ltd., Ilford, Essex.*

Additional Imraks

SOME interesting additions to the Imrak range of panel framework components which still further extend their range of application are announced. They include a new series of open Imraks to provide an economical panel framework when it is not necessary for the equipment to be enclosed. They are available in two widths and four heights.

There are also new mobile bases to match the attractive appearance of the racks in the series and new extension plinths to provide greater stability where the racks are used to support heavily loaded withdrawable chassis. Finally, there are filler plates to blank off the base. *Alfred Imhof Ltd., Uxbridge, Middlesex.*

Fine wire butt welder

A NEW precision fine wire butt welder has just been added to the Spembly range of welding equipment. This ensures accurate concentric alignment of wires from 0·040 in. dia down to 0·006 in. dia, so ensuring precision butt welds. One wire is loaded into the collet of the stationary head and the other into the sensitive clamp in the moving head. With a finite gap between the two wire ends the moving head is brought up to the stationary head and the wires touching completes the circuit and make the weld. *Spembly Ltd., Chatham.*

CURTAIN RAIL ELECTRICALLY OPERATED

A SYSTEM designed to open and close curtains by means of an electric motor has been announced by Thos. French Ltd. The motor operates from normal a.c. supply and is controlled by a push-button tumbler switch. It drives a flexible, spirally formed cable which carries master and suspension runners on which the curtain is hung. Cable is supported throughout its length either in a channel incorporated in the runner rail or in tubing linking adjacent lengths of rail. The cable runs through a hollow spindle in the motor and through a driving nut threaded to conform to the spiral of the cable. As the nut rotates, the cable acts as a lead screw and moves laterally through the motor either way, depending on the direction of motor rotation. Master runners are attached to the cable and the leading edges of curtains are fastened to the master runners so the rotating cable either opens or closes the curtains. Length of travel of the cable is controlled by limit switches which automatically stop the motor when master runners are in the required position. The entire system is mounted on a headboard. The system, designed primarily for commercial usage, could also be used as a domestic luxury. *Thos. French and Sons Ltd., Chester Rd, Manchester 15.*

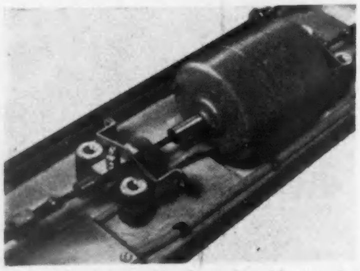
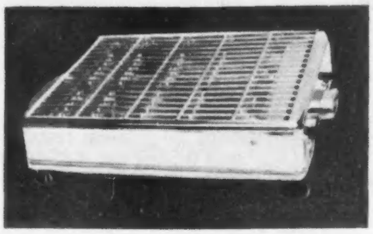


Figure shows spirally formed cable passing through motor

Platewarmer-cooker

A THREE-HEAT platewarmer-cooker has been announced this week by Metway. It is loaded to a maximum of 800 W and minimum of 200 W. Elements are controlled by two switches, one either side of a flat connector block. Finished in chrome, and with a removable base tray, the unit can be used at table to keep plates and dishes warm. It is priced at £3 18s 6d and does not incur purchase tax. *Metway Electrical Industries Ltd., Canning St, Brighton 7.*

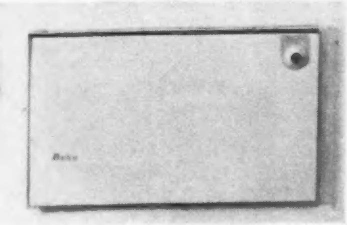


Electroluminescent lamps

BY designing a system where electrical energy is converted directly into light — electroluminescence — Thorn Electrical Industries have produced a series of "Panelume" lamps which have domestic, commercial and industrial applications. They are claimed to be economical; 1 sq in. of ceramic panel requires only 0·2 mA from mains supply. They are available in green or blue and have obvious applications for control panels, signs and, in the home. *Thorn Electrical Industries Ltd., Gt. Cambridge Rd, Enfield.*

Panel heaters from Scandinavia

WITH the growing popularity of the concept of "whole-house" heating, the Scandinavian firm of Beha have introduced in this country a range of panel heaters for wall mounting. There are eight different sizes of wall mounting panels in the range with loadings varying from 600 W to 1·5 kW. Heaters have very slim styling and operate on the convection principle. Easy to mount, they are simply fixed by screw-in brackets. The eight sizes include both panel and skirting board heaters, the former having six-heat control and the latter three-heat switches. The skirting board models are reversible and can be fitted with switches at either end. If required, temperature can be controlled thermostatically. *Distributors: Denham and Morley Ltd., Denmore Hse, Cleveland St. W.1.*



New from Norway, the Beha panel heater

Generalised demonstration machine

A GENERALISED machine, able to demonstrate the operation of most conventional a.c. and d.c. machines, has been developed by Mawdsley's. A description of the prototype machine was given in ELECTRICAL TIMES, 18 May, 1961, and this has now been improved in certain respects. Features of the machine are a 48-coil stator winding with all coil ends brought out, a single rotor winding with both slip-ring and commutator connections, and brushgear, which can be motor driven. Search brushes are provided for examining commutator voltage, and torque used to drive a coupled load machine is measured by a special torque unit, depending for its action of change of permeability with torque. A tachogenerator is also included on the machine set. The company is shortly to publish a description of the machine. *Mawdsley's Ltd., Zone Wks, Dursley, Glos.*

Ultra-violet flame detector

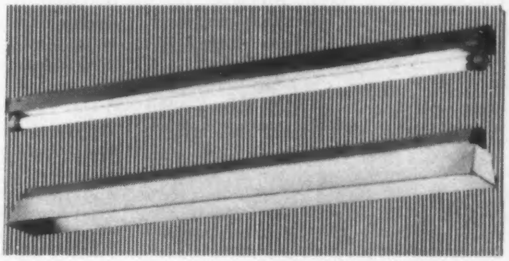
IT sometimes happens that an industrial heating process may be required to operate at incandescent heat, but that no flames shall be present. Though all incandescent bodies emit a certain amount of radiation in the u.v. range, it is relatively small as compared with that of a flame, since processes which occur in ionisation within a flame result in an enhanced radiation in the u.v. spectrum.

The Elcontrol, Type UV, flame detectors have been designed to be particularly responsive to radiations in this range; the UV1 being for flames with a large amount of modulated u.v. output and the UV2 for conditions where the output is more restricted. The photo-sensitive cell is housed in a cast aluminium head with asbestos gasketed cover, and is attached to a sighting tube. Further details and advice in the use of the cells can be obtained, on request, from the makers. *Elcontrol Ltd., Hitchin, Herts.*

One-piece lampholder

COMPETITIVE pricing should commend a one-piece lampholder introduced by G. Turnock Ltd. Phenol formaldehyde has been used for the outer casing and threads have been chased to prevent jamming of the shade-retaining ring. Flex is self-anchoring to a porcelain terminal block and the lampholder is said to be easy to wire. Designated TM/401, the lampholders sell at 16s 11d/doz, retail. *G. Turnock Ltd., Tunion Wks, Navigation St, Walsall.*

"THINK SLIM WITH G.E.C."



Channel fitting from new "Slim Jim" range and with reflector attached

WITH the above slogan for retailers, the General Electric Co. announced last week that, as from 4 Oct., the new "Slim Jim" range of competitively priced fluorescent lighting fittings will be available from production. Following the general trend in popular priced fittings, the new range comprises seven basic channels with a choice from 12 attachments. A departure, though, is that three of the channels (or battens) incorporate "snap-start" control gear, these being the 4 ft single tube and 5 ft single and twin tube, while the remainder have conventional switch start control gear. (Incidentally, "snap-start" is the new name for GEC "instant-start" gear by which it will be known in future, even though the old name still appears on the "Slim Jim" broadsheet.)

The full range of battens and attachments with prices, inclusive of warm white "Osram" tube, purchase tax and surcharge, are listed below.

The attachments are: A, one-tube "Diakon" diffuser; B, two-tube "Diakon" diffuser; C, one-tube stove enamelled open-end reflector; D, two-tube stove enamelled open-end reflector; and E, "Perspex" closed-end reflector.

The fittings, which are light and well designed, incorporate a number of novel features. Each is provided with a snap-in cover/reflector to the channel, spring retained end plates and spring loaded bi-pin holders which are easily slipped into place in slots in the channel. The attachments are also retained in position by a simple snap-in device. Tube and channel are supplied together in a single pack with other attachments separately boxed. *GEC Heating and Lighting Group, Kingsway, W.C.2.*

	Channels		Attachments				
	1-tube	2-tube	A	B	C	D	E
2 ft 20 W	64s 3d	103s 6d	27s 7d	36s 0d	—	—	—
4 ft 40 W	81s 10d	—	39s 7d	—	—	—	—
5 ft 80 W	96s 6d	184s 0d	42s 0d	63s 1d	23s 0d	23s 0d	60s 0d
8 ft 125 W	142s 6d	250s 0d	69s 8d	102s 2d	45s 0d	45s 0d	—

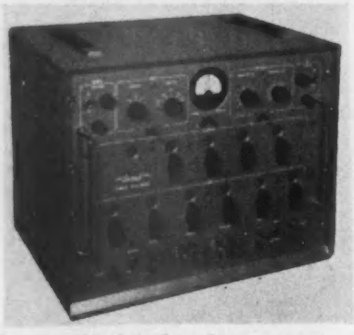
The Wayne-Kerr coaxial ratio transformer

Coaxial ratio transformer

A RANGE of coaxial ratio transformers with indicated ratio accuracies from 0·01% to 0·001% between 50 c/s and 10,000 c/s are now available. These are the Wayne-Kerr, Models CRT-1, 2, 3 and 4. All have a high input impedance, terminal linearity of 0·001% and continuous resolution by in-line concentric dials. The 1 and 2 models are designed for restricted panel space, five units being easily mountable on a 3½ in. by 19 in. panel. The CRT1 gives six place digital readout and the CRT2 five place readout. The CRT3 and CRT4 are subminiature types for small panel areas with minimum depth to meet military specifications. Both, however, have an accuracy of 0·001% and give five- and six-place resolution respectively. All four units weigh approximately 7 lb. *Wayne Kerr Laboratories Ltd., New Malden, Surrey.*

Low voltage blanket

FOR those who like their electric blanket left on all night, Pifco have announced a low voltage model. They are available in single and double sizes with a transformer to reduce 250 V mains supply to 12 V. An illuminated selector switch offers three-heat control. With the double version of this blanket, two transformers are supplied so that either half may be adjusted to user's requirements. Prices, including cost of transformer unit, are £10 11s 8d for single size and £20 2s for double. *Pifco Ltd., Pifco Hse, Watling St, Manchester 4.*



On page 426 of the Sept. 21 issue the photograph of a Wayne Kerr Gertsch Variable Phase Standard was shown as the Complex Ratio Bridge. The above photo is that of the Bridge described

Fan now has reverse

NOW available with a reversing capacitor start motor is the "Super Minex" fan, which has two-speed air intake and extraction. The unit has a transparent external louvre and an 8 in. dia four-bladed impeller. It can be installed in a window or into a wall and is also said to operate vertically from ceilings. Two-tone colour finishes are available as well as standard white enamel finish, and the fan is supplied complete with four-core cable and switch box. It is priced at £10 19s 6d. *Jones and Stevens Ltd., Eastern Bypass, Littlemore.*

Fluorescent trough fitting

SAID to be suitable for medium and high bay factory lighting is a trough fitting produced by Vanguard and incorporating a Philips double flux tube. Rated at 125 W the 5 ft tube gives a 6,125 lumens output. It is claimed to have a 5,000 hr life and, although the loading is high for a 5 ft fitting, the lamp can be fitted into standard bi-pin holders. The fitting will be sold complete with tube at a price between £7 18s and £8. *Vanguard Eng. Co. Ltd., Woolwich Church St, S.E.18. Philips Electrical Ltd., Shaftesbury Ave, W.C.2.*

Price reductions

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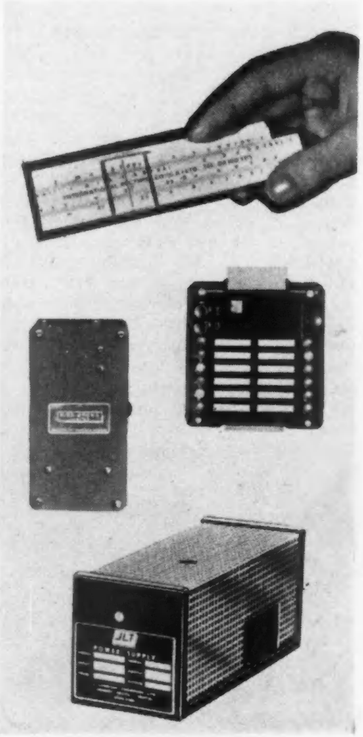

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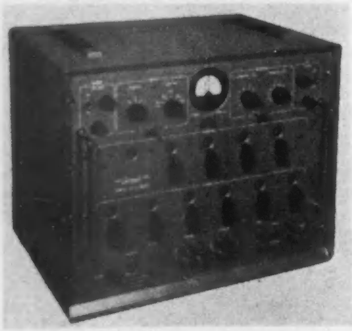
The Wayne-Kerr coaxial ratio transformer

Coaxial ratio transformer

A RANGE of coaxial ratio transformers with indicated ratio accuracies from 0·01% to 0·001% between 50 c/s and 10,000 c/s are now available. These are the Wayne-Kerr, Models CRT-1, 2, 3 and 4. All have a high input impedance, terminal linearity of 0·001% and continuous resolution by in-line concentric dials. The 1 and 2 models are designed for restricted panel space, five units being easily mountable on a 3½ in. by 19 in. panel. The CRT1 gives six place digital readout and the CRT2 five place readout. The CRT3 and CRT4 are subminiature types for small panel areas with minimum depth to meet military specifications. Both, however, have an accuracy of 0·001% and give five- and six-place resolution respectively. All four units weigh approximately 7 lb. *Wayne Kerr Laboratories Ltd., New Malden, Surrey.*

Low voltage blanket

FOR those who like their electric blanket left on all night, Pifco have announced a low voltage model. They are available in single and double sizes with a transformer to reduce 250 V mains supply to 12 V. An illuminated selector switch offers three-heat control. With the double version of this blanket, two transformers are supplied so that either half may be adjusted to user's requirements. Prices, including cost of transformer unit, are £10 11s 8d for single size and £20 2s for double. *Pifco Ltd., Pifco Hse, Watling St, Manchester 4.*



On page 426 of the Sept. 21 issue the photograph of a Wayne Kerr Gertsch Variable Phase Standard was shown as the Complex Ratio Bridge. The above photo is that of the Bridge described

Fan now has reverse

NOW available with a reversing capacitor start motor is the "Super Minex" fan, which has two-speed air intake and extraction. The unit has a transparent external louvre and an 8 in. dia four-bladed impeller. It can be installed in a window or into a wall and is also said to operate vertically from ceilings. Two-tone colour finishes are available as well as standard white enamel finish, and the fan is supplied complete with four-core cable and switch box. It is priced at £10 19s 6d. *Jones and Stevens Ltd., Eastern Bypass, Littlemore.*

Fluorescent trough fitting

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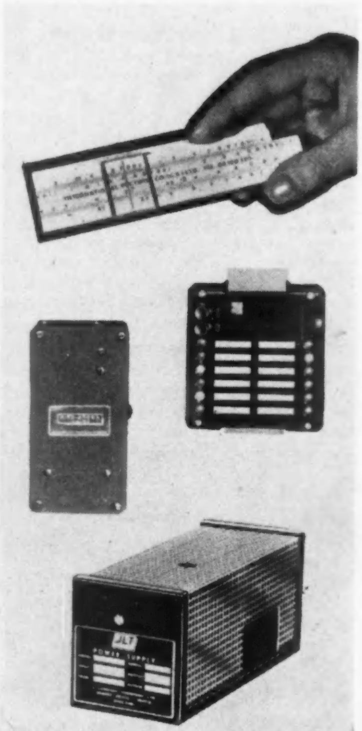

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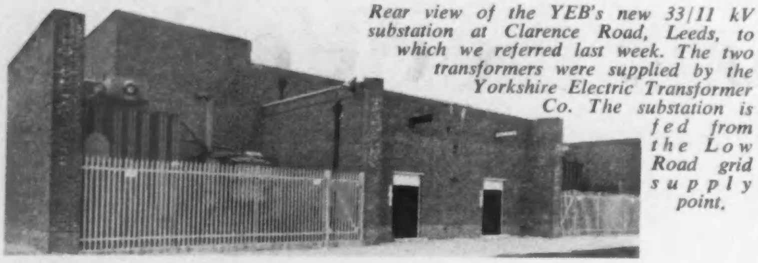


Rear view of the YEB's new 33/11 kV substation at Clarence Road, Leeds, to which we referred last week. The two transformers were supplied by the Yorkshire Electric Transformer Co. The substation is fed from the Low Road grid supply point.

Fit Plugs to All Appliances?

IT is wrong and dangerous to sell an electrical appliance without a plug-top properly secured and attached by a responsible electrician. That is the view of Mr J. W. Dronsfield, a member of a district committee of the North Western Electricity Consultative Council, who has suggested that the time is now right to press for legislation requiring that all appliances should be equipped with the approved length of flex and a BS plug attached. He feels that even if the plug might not be the right type for the customer's wiring, it could be exchanged at the shop without serious loss.

But Mr A. O. Johnson, chief commercial officer, North Western EB, considers that the appeal raises an extremely contentious subject. While in sympathy with Mr Dronsfield, the Board feels it is too early to take any positive action, for although such standard plug-tops had been widely adopted in the last few years, they were generally used only in new premises, and it was doubted if more than 20% of homes had them fitted. There would be considerable criticism if the Board insisted on fixing plug-tops of a pattern which it knew was wrong. It could, in fact, be adding to the risks, because a very large number would need to be changed, and the probability is that these would be changed by an amateur handyman. Mr Johnson considers that their present practice of finding out from the consumer the type of plug-top required, and then fitting it to the appliance, was the best that could be done under the present circumstances.

Purchase tax on block storage heaters is another matter which has been occupying North Western Consultative Council. At their recent meeting they decided to send a protest to the MoP against the imposition of p.t. on these appliances. One of the first moves to be taken since domestic models were introduced, and p.t. consequently applied to both these and the hitherto exempt commercial models, it will be interesting to see what response the protest receives from the Ministry.

Moratorium for Duncan Price

CREDITORS of the lighting fittings firm of Duncan Partners and Price Ltd. have agreed to grant the company a moratorium until 31 Jan. next, when the position is to be reviewed. It was stated that total creditors amounted to £21,128 as at 15 Aug. last. The company is endeavouring to sell the lease of its Powis Mews premises for £3,250 and, if this is accomplished, liabilities will not exceed assets, it was stated. A trustee with a committee of inspection has been appointed.

Ionosphere Conference

AN international conference on the ionosphere will be staged by the Institute of Physics and the Physical Society in London next year from 2 July to 6 July. The principal sessions and opening speakers will be: Ionospheric constitution and ionising radiations (Dr H. Friedman, US Naval Research Lab.); Geomagnetism and the ionosphere (Dr C. O. Hines, Defence Research Telecommunications Establishment, Ottawa); Irregularities in the ionosphere (Dr B. H. Briggs, Cavendish Lab., Cambridge); and Mathematics of wave propagation through the ionosphere (Prof H. G. Booker, Cornell University). Other contributions are invited, and should be accompanied by a 100 word to 150 word abstract.

Potentiometer know-how sold to U.S.

PLESSEY, the sole producer of moulded track potentiometers in this country, have granted an exclusive licence to the Centralab Division of Globe Union Inc., USA, to manufacture and sell their range of these products in the US. Centralab have also been granted a non-exclusive licence to make and sell these potentiometers in Canada, and Central and South America.

The track consists of a phenolic moulding loaded with carefully controlled portions of conducting carbon filler.

OFFICIAL PUBLICATIONS

Lighting of Traffic Routes Within the London Conurbation, Consultative Committee's final report (see page 490).

B.S. 3403. Indicating Tachometers for general industrial use. 6s.

Jubilee in contracting

FIFTY years' service in the electrical contracting and engineering industry by the Watford firm of J. W. Russell Ltd. was celebrated at a luncheon at Watford Town Hall last Thursday, which was attended by nearly 300 friends and representatives of firms who have been associated with the company. The growth of the business, from a staff of three to the present 150, was recalled by Mr W. A. Evetts, a recently retired long-serving member of the staff.

Welcoming the guests, in reply, Mr D. T. Russell, a director, said his father had started the business with three principles: good quality materials, good workmanship and loyalty to staff. He trusted that they would still be upholding those principles in 50 years' time.

Tribute was also paid by the Mayor of Watford, Councillor J. R. Hicks.

U.K. SLIPS TO THIRD PLACE AS ELECTRICAL EXPORTER

GRAPHS of the comparative growth in exports by various countries always make the UK's performance look worse than it really is, because of the low base from which many started in the post-war era. Even so, a comprehensive survey entitled "Trends in UK and World Exports of Manufactures," accompanying the 29 September issue of the *BoT Journal*, shows that there is no room for complacency on the part of British electrical manufacturers. While a number of countries have doubled their electrical exports in the past seven years, and Japan's have rocketed up twelvefold, West Germany, USA and Britain still account for two-thirds of the world total. The important thing here is that the order has changed; Britain's share has slipped from one-quarter to 18%, while the US has performed similarly with a drop from 27% to 20%, and West Germany has emerged on top with 24% of the market in 1960, against 19% in 1954.

In terms of value, the shifts among the three leaders look even less favourable to the UK, whose exports rose by $179 million to $655 million during the period. Those of the US went up by $199 million to $739 million, while West Germany's jumped by $475 million to $842 million.

Japan's share of the market is now 7½% with exports in 1960 worth $274 million. Among the second-liners, others to do well are: Italy, up from $39 million to $95 million; Netherlands, from $158 million to $348 million; France from $136 million to $263 million; and Belgium-Luxemburg, from $63 million to $114 million.

The figures cover all types of electrical machinery, apparatus and appliances, with the exception of transport equipment, which the survey deals with under a separate heading.

OUTPUT and ORDERS shoot AHEAD

THE BoT's provisional index of electrical engineering output shows a sudden spurt in June, though much of the 14% increase over May is no doubt due to the completion of an unusually large number of contracts, for deliveries show an even sharper upturn before subsiding to more normal level in July. Compared with a year ago, June's rise in electrical engineering output is also 14%.

June is the latest month for which estimates of output are available but, taking the mechanical and electrical engineering industries together, estimates of orders, as well as deliveries, are available up to the end of July. These suggest that the decline in electrical exports already known to have taken place in August will be short-lived, for July saw a spate of export orders such as has rarely been seen, with the intake almost 50% higher than in the preceding month. While it is not known how much of this is attributable to the electrical industries, EE's £6 million order to build a 120 MW extension to South Cairo station, first announced in that month, suggests that the electrical manufacturers obtained their share. In any event, the export order book of the combined engineering industries at the end of July was the longest for years and 12% higher than a year ago, while the home order book was up 10% on the year.

Atlas Computer for London University

THE University of London has ordered a Ferranti "Atlas" computer, valued at approximately £2 million, for operation towards the end of 1963. Claimed to be the most powerful computer in the world, it will meet the ever-increasing volume of computation involved in present-day research projects. The British Petroleum Co. is providing about a quarter of the cost, in return for which it will have an agreed amount of time on the "Atlas" for five years.

Automatic Programming for Steel Rolling

PUNCHED cards in conjunction with photo-transistors are used to control steel rolling mill operations in a new automatic programming system developed by the Metal Industries Division of English Electric. The cards, which are of tough plastics, control the complete sequence of screw-down, manipulate mill speed settings and the number of passes in a rolling operation.

The system is an advance on the uniselector system introduced by the company two years ago, for it offers a greater programme storage capacity than can economically be obtained with uniselectors.

The first installation of the new system is at the Hallside reversing billet mill of Colvilles, where it is controlling the screw-down.

All the information necessary for one pass of the mill may be stored on a double line on the card, a system which obviates the need for an intermediate memory store. The sensing devices are photo-transistors, the output from which is amplified by transistor amplifier controlling a small plug-in relay. The relays operate at the various position control systems. All components except the relays are mounted in standard printed circuit units.

KEMPSTON TAKEOVER

A CONTROLLING interest in the business of Kempston Electrical Co. Ltd., of Kempston, Beds, has been acquired by Mr L. B. Abbott and Mr L. A. Timbrell from Mr P. W. Townsend who has been managing director since the concern was founded. Mr Townsend will continue for a time as a director in an advisory capacity. A new company has now been registered, which we note on page 511.

A look at Consultative Councils

HOW electricity consultative councils do their job in representing consumer interests to the electricity boards is discussed in the current number of *Shoppers' Guide*, the BSI Consumer Advisory Council publication. Reports for 1959-60 have been analysed, and a list is given of problems raised by the councils and the corresponding action taken by the boards. No individual judgments are offered, although it is stated that "if their reports accurately reflect the various councils' work, then some have appeared a good deal more active than others." Variation in keenness on publicity is noted, and it is suggested that few spent the £250 on publicity that the Minister of Power permitted.

G.E.C. fittings campaign

AN extensive advertising campaign, launched this week, is backing the introduction of a new range of fluorescent lighting fittings under the name of "Slim Jim" by the General Electric Co. Ltd. Details of the range are given on page 499. Press advertising, using the slogan "Think Slim with GEC," is to appear in a wide selection of magazines and provincial newspapers, continuing to the end of the year. There are also special arrangements for dealer co-operation with customer distribution.

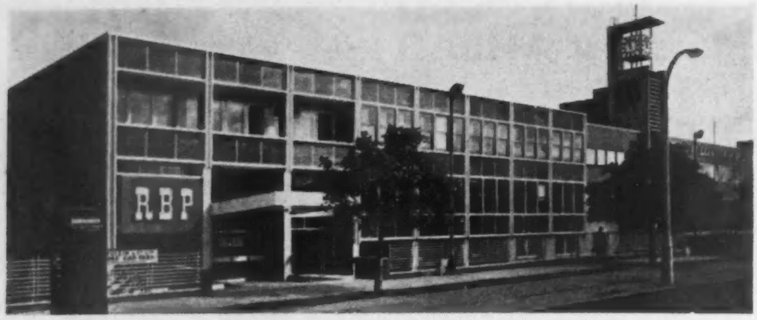
Selling Sadia in Holland

DESPITE a 23% import tariff on water heaters, Aidas Electric Ltd. have established a foothold in the Common Market through their Dutch associate company, Sadia Nederland NV. These efforts were initiated in 1956, but a new type of water heater to meet the local requirements in Holland has now been evolved. Named the "Twinstar," it has two immersion heaters (one to automatically operate on cheap night rates) and copper water containers, 0·064 in. thick, reinforced with steel bands to withstand a test pressure of 200 lb/sq in. These are at present manufactured at Northolt and shipped complete, but it is planned to build a factory to manufacture in Holland at a later date.

LABOUR PARTY EXPEL E.T.U.

NOW the Labour Party executive has expelled the Electrical Trades' Union from its membership. The decision was overwhelmingly endorsed on Monday at the Party's annual conference at Blackpool. The grounds for the decision is that the ETU is under the control of the Communist Party, an organisation proscribed by the Labour Party. It means, of course, that the latter will no longer get an annual subscription (usually about £5,000) from the ETU.

This 32-circuit switchboard, on final test at English Electric's Stafford Works, is for the LCC's Southern Outfall Works, to be commissioned next year. The 6·6 kV 250 MVA double busbar board will control the power supply from the dual fuel diesel alternator sets to existing pumping stations in a ring main system. The board is solenoid operated. Current ratings are 400/800/1,200 A.



The new office building of R. B. Pullin and Co., Great West Rd, recently opened, marks the second stage of reconstruction at Phoenix Works

Tests Favoured for Staff Selection

MANY people are suspicious of a systematic approach to staff selection. Candidates in particular are apt to feel that interviews by an industrial psychologist, or person who gives himself some such title, will be too clinical and too closely confined by the interviewer's textbooks and prejudices. On the other hand, more easy-going methods are likely to prove unbearably costly for the employers, and candidates have not much confidence in such tactics either. What does Mr R. S. Stokes, director of studies at the Electricity Council Training Establishment at Horsley Towers, think? His answer is given in a paper which he presented to a BIM conference in Glasgow last week.

First, Mr Stokes is all for the professional approach, so much so that he does not consider it out of place for a selection officer earning £1,750 to *advise* on the appointment of an engineer to earn £3,000. Snap judgments, intuition, and other haphazard methods, are seen as quite inadequate. For one thing, the interviewer will probably have an imperfect knowledge of what the job is; for another, the whole question is too important.

Many executives selected and promoted by haphazard methods are naturally tempted to regard such a system as efficient, but the untrained interviewer may well be measuring achievement when he thinks he is measuring intelligence. Specialist advice is needed and the personnel manager should be consulted on all appointments.

In this context, it is all the more significant that Mr Stokes is cautious about selection consultants. He advises anyone contemplating the use of such firms to have a word with the BIM, who keep a register of consultants.

Selection panels are unequivocally damned. They make the candidates behave unnaturally, and consistently select the safe mediocrity. Moreover, the selectors spend more time assessing each other than they do the candidates.

Where does that leave us? Mr Stokes favours the use of tests, unpopular as they are with candidates. The only way to measure intelligence is to measure it, and this cannot be done at an interview. Then intelligence has to be related to achievement, in order to assess the candidate's drive, application and energy. Nevertheless, the interview remains important to find out what kind of person the candidate is; the removal of incompetent people has become too difficult and expensive for square pegs to be put into round holes.

Industrial Heating Show at Manchester

AN exhibition of industrial heating which is being staged by North Western EB opened at Manchester yesterday and will continue until 13 Oct. Induction heaters and various types of furnace make up the bulk of the exhibits, and there is also an industrial advisory service. No ticket is needed for the exhibition, which is being held at NWEB's Polygon Depot, Ardwick, and is open from Monday to Friday between 10 a.m. and 5 p.m.

Labour would set up consumers' council

THE formation of a governmental consumers' council to watch the day-to-day interests of shoppers in such matters as quality, safety, advertising, restrictive practices, and retailing methods is advocated in a pamphlet just issued by the Labour Party. It is contended that the Conservative Government has failed to make use of the weapons the law already provides, rather than that any major changes in the law are needed. By co-ordinating the activities of various Ministries under a new department of the BoT, the consumers' council would exert greater influence on traders through a greater willingness to litigate.

Few revolutionary propositions are made in the pamphlet, which is a discussion of aims as distinct from a statement of policy, but with regard to hire-purchase it is suggested that the consumer should be able to cancel his contract and recover his deposit within a reasonable period—say 48 hr. A cautious attitude is adopted on resale price maintenance, there being some leaning towards the view that each trade should have to prove its case for restricted prices. Similarly, an advertiser would be required to prove the truth of his claims if challenged to do so.

Sales Index Steady

LOWER sales of appliances and other household durables in August were offset by increased turnover in food and clothing shops, so that the BoT index for all retailing remained at the July level of 117, as indicated by preliminary estimates three weeks ago. As an aftermath of the "Little Budget," h.p. sales of household goods sagged 20% from the inflated level of July, but like retail trade generally were still about 7% higher than in August, 1960.

BOARDS' APPLIANCE SALES in 1960-61

THE reduction of nearly £8 million in sales of domestic appliances by the 12 area electricity boards in England and Wales for the year ended 31 March last, revealed in the annual report of the Electricity Council last week, can be attributed to the credit squeeze. That the pattern was fairly regular throughout the country is indicated from our accompanying table, which lists the sales of major appliances by eight of the boards. The North Eastern show a welcome improvement in the sales of cookers, with a small increase also by the East Midlands Board. But in sales of washing machines the Eastern Board did not suffer quite such a large reduction as did the North Western. One unusual feature—while most radio and TV retailers were experiencing depressed sales, the Midlands Electricity Board chalked up an increase in that sphere, selling 18,236 radio and TV receivers compared with 16,558 sold by the Board in the previous year.

Among other statistics available, sales of vacuum cleaners by the Merseyside and N. Wales Board dropped from 10,700 to 8,073 in the year to 31 March last.

Appliance Sales in year to 31 March, 1961
(Previous years' figures in parenthesis)

Area Board	Cookers	Refrigerators	Washing Machines
South Western	25,740 *(27,147)*	8,797 *(10,144)*	5,584 *(8,351)*
Eastern	44,579 *(45,382)*	25,171 *(34,126)*	15,776 *(24,011)*
East Midlands	22,188 *(22 026)*	5,641 *(6,668)*	4,639 *(7,052)*
Midlands	29,547 *(30,188)*	15,312 *(17,914)*	14,761 *(23,330)*
Merseyside and North Wales	28,800 *(28,881)*	7,398 *(8,034)*	7,567 *(13,032)*
Yorkshire	31,881 *(35,202)*	7,964 *(8,783)*	6,864 *(12,920)*
North Eastern	22,637 *(20,796)*	4,871 *(5,115)*	5,115 *(8,498)*
North Western	42,638 *(44,001)*	13,060 *(15,378)*	15,149 *(25,387)*

THE BOMB AND THE BATTLESHIP

A LOT of things are obsolete but, unfortunately, warships are not, Sir Hamish MacLaren said at the Batti Wallahs' September luncheon when he delivered a talk bearing the uncompromising title: "Birth of a Battleship." Russia's 500 submarines are a measure of the threat which might have to be faced in the event of a non-nuclear war, he pointed out, and an assessment of present conditions has led to the development of the Devonshire Class guided-missile carrier, the commando carrier which recently gave such a good account of itself at Kuwait, and the nuclear-propelled submarine, which is the first true submarine, as distinct from a merely submersible craft dependent upon batteries.

Right through from the initial thoughts in the mind of the First Lord, the various stages were described up to the final trials, by which time the equipment in the ship was out of date, particularly in the electrical field, and steps were taken to remedy this. The next stage, sometimes, was awkward questions in the House by the guardians of our purses. Until last year, Sir Hamish was Director of Electrical Engineering at the Admiralty.

The next luncheon will be held on 25 Oct., at the Connaught Rooms as usual.

McFadzean Laboratory

TO commemorate the official opening of their McFadzean Laboratory at Wood La by the Duke of Edinburgh earlier this year, British Insulated Callender's Cables Ltd. have just issued a very impressive brochure which, apart from briefly describing the laboratory itself, outlines the type of research and other activities carried out on each floor of the building. Colour is attractively used throughout the publication, which also includes potted biographies of the heads of the management.

Sayings OF THE WEEK

"Selection [of staff] by panel alone is one of the worst possible methods. If you have your fair share of luck as a gambler, dice or cards would be a better proposition." . . . MR R. S. STOKES, director of studies, Electricity Council Training Establishment, speaking at British Institute of Management conference.

"The art of heating and ventilating is becoming more and more akin to an exact science, though it will probably never fully attain this status." . . . MR N. S. BILLINGTON, at International Conference on Heating, Ventilating and Air Conditioning.

PRICES of cable metals and other materials

Figures quoted are the official prices ruling on Tuesday, October 3

	£ per ton	Weekly change £		£ per ton	Weekly change £
COPPER, standard class A			ZINC, virgin, min. 98% purity		
(settlement) ...	222¾	—	(cash)	73¼	−1¼
,, (3 months)	225¾	−1⅛	,, (3 months)...	73½	−1
LEAD, refined pig. 99·97% purity			RUBBER, per lb		—
(cash)	62¼	−1⅛	No. 1, RSS. spot	25⅛d	—
,, (3 months)	64¾	−1	c.i.f. basis, ports. Dec. ...	24⅞d	+⅛d
TIN, refined, min. 99·75% purity			ARMOURING:		
(settlement)	944	−16	Galv. Steel Wire (0·104 in.) ...	68¼	—
(3 months)	955	−12½	Mild Steel Tape (0·04 in.) ...	53½*	—
ALUMINIUM, ingots 99-99·5% ...	186	—	NICKEL (home)	660	—
,, wire bars (4×4×54")	193¼	—	MERCURY (76 lb flask)	62	—
BRASS Strip 63/37	190¾	−8	AMERICAN PRICES:		
SILVER (Troy oz)	79¾d	—	Copper, electrolytic (per lb) ...	31c	—
			Lead (New York)	11c	—

* *Tape Price, now on average, includes varnishing*

LARGE CONTRACTS AWARDED

TWO companies are sharing orders from the BTC for 27 complete main line diesel electric locomotives. English Electric will make 17 locomotives of 1,750 h.p. and Brush Electrical ten of 1,365 h.p. In addition, British United Traction will supply 20 sets of 230 h.p. engines and transmissions for multiple-unit motor cars as well as a similar number of control sets for trailer cars, which will be used in trains to be built in railway workshops. Total value of the three orders is £2½ million.

PLESSEY have received an order worth around £450,000 to supply further ferrite core memory systems, complete with their own special stabilised power supplies, for the Ferranti "Atlas" computer. The first "Atlas," claimed to be the most advanced computer in production anywhere in the world, is now being installed at Manchester University, and the second is to be used by the UKAEA. Of the £3½ million for the UKAEA's "Atlas," the Plessey memory system will account for about £350,000.

AN automation order, worth £¼ million, has been received by Honeywell Controls for the new integrated steelworks of Richard Thomas and Baldwins, Newport, Mon. Temperature, flow, pressure and oxygen analysing equipment will be supplied for reheating and heat treatment furnaces, and instrumentation will be installed for lime kilns, ore dryers, pickle line, acid recovery and other plant.

PIRELLI-GENERAL Cable Works have received a £236,207 contract with the CEGB, S.E. Region, for the manufacture and installation of some 27,000 yd of 132 kV 0·75 sq in. oil-filled cable and 18,000 yd of telephone and supervisory cables to be installed between Wimbledon grid and Wandsworth substation.

VISITS to Poland by Laurence, Scott and Electromotors' marine sales manager have resulted in an order exceeding £100,000 to supply electrical equipment for 13 stern trawlers to be built in that country. The equipment for each vessel includes one 240 kW and one 120 kW variable-speed shaft-driven generator, one 300 h.p. trawl winch motor, two 120 kW diesel auxiliary generators and all associated control gear. The main propulsion engines are being made by the Hawker Siddeley subsidiary, Mirrlees, Bickerton and Day.

News in Brief

New Forest RDC have conditionally opposed proposals for the CEGB power station in the Fawley area. Unless cogent overriding reasons demanded the siting of the station there, they consider the land should be included in the Green Belt.

LCC propose to modernise and convert nine three-storey Georgian houses in South Lambeth Rd, five for occupation by large families and four by old people. Electric heating, cooking and water heating will be installed in 18 single-room flats for old people.

"Production Control as a Means to Higher Productivity" is the subject of a conference, organised by the Willesden and Hendon Productivity Association, to be held at the FBI, 21 Tothill St, S.W.1, on 22 Nov. Admission fee 3 gn. Requests for reservations to Mr D. I. Duncan, AEI Switchgear Div., 20 Neasden La, N.W.10.

Last week 20 overseas agents of Henry Wiggin and Co. Ltd. visited the firm's new works at Holmer Rd, Hereford.

Production at A. J. Flatley's new factory at Bantry Bay, Co. Cork, has begun with about 70 workers. Initial production is of the low-priced collapsible clothes dryer launched recently.

L. M. Ericsson Co., of Sweden, and Marconi's Wireless Telegraph Co. have jointly formed a new company in Nigeria, to be known as the Nigerian Telecommunications Corporation.

Company Activities

BRITAIN'S biggest, Imperial Chemical Industries, sat heavily upon stock market sentiment last week—so hard, in fact, that the *Financial Times* industrial ordinary index went through the floor to a new 1961 "low." Although volume sales for the half-year to 30 June were a record, by value they had dropped to £287 million compared with £288 million in the first half of 1960, while the group income before tax was down to £36·7 million against a comparable £50·2 million. ICI's performance is taken by a great number as a barometer to the general state of UK trade, and this time the performance was thought to be not at all polished. Down sank the company's £1 Ordinary shares—and a great deal of the market with them.

Not even the happy results of EMI could prevent a certain amount of gloom spreading into the electrical market. Despite the claim by Sir Robertson King that the electricity supply industry will need to spend £200 million more on plant during the next four years than capital estimates originally provided for, AEI went on dropping from 35s to hit a new 31s 3d "low" for the year, GEC, too, hit a "low" of 25s 9d before finishing the week at 26s 3d, while English Electric at 27s touched bottom before their £6 million Cairo order helped them back to 27s 6d.

EMI's 10s shares were also down to a 1961 "low" of 34s 4½d immediately before the results were made known, but the 20% rise in sales from £68·7 million to £82·44 million and the 13% increase in the group trading profit were good enough to lift the shares back to 36s. It was also a relief that directors felt able to maintain the dividend at a total of 17½%. EMI's group net profit for the year at £2,443,000 against £2,413,000 previously shows an increase of only £30,000, but this figure, apart from other adjustments made, is struck after a £120,000 bigger tax bill of £2,834,000, depreciation £510,000 higher at £1,932,000 and interest charges £168,000 greater at £456,000. The only disturbing feature about the figures is that they cloak a pretty hefty setback in the results of the Morphy-Richards group. It can be calculated that the annual rate of fall there has been something like £930,000 to about £270,000.

But it was really left to Hoover to provide the real excitement last week. Rumour swept the City that the American parent was about to make a bid for the minority 5s Ordinary and 5s "A" Ordinary shares in the company. So up rocketed the Ordinary 6s a time to 52s 6d and the "A" at the gentler pace of 3s 6d to 48s. Then a spokesman for the American company said that as far as he knew the position was still the same as on 29 March when the company's chairman told the annual meeting that there was no intention of buying the minority holding in British Hoover. So about turn, and down came the Ordinaries to 50s, but still 3s 6d better over the week, and the "A" subsided to 42s 6d, making them 2s a time cheaper on the week.

Elsewhere, Pifco fluctuated between 53s 3d and 52s and the news that their 1957 £510,000 loan to take over the Pifco business is now down to £150,000 outstanding, and will be paid off before the end of next March, did nothing noticeably to help the shares. Dimplex, from 84s at the start of the week, hotted up to an all-time 87s 4½d "high" before cooling down again to 84s 3d and then closing the week at 85s 3d. Altogether, the week proved a topsy-turvy one for the electrical market.—*From our City Correspondent.*

H. J. Baldwin

Preference dividend is again being passed. Directors announce that the half-yearly payment on the £200,000 of 7% cumulative prefs., due on 30 Sept., will not be paid on that date. Instead, consideration of a payment is being deferred until full accounts are available for the year ended on 30 April last.

Electrical Components

The Chancellor's curbs have had no dramatic impact on electrical wholesaling, judging by the remarks of Mr L. S. Seccombe, chairman, at the annual meeting. So far, the "Little Budget" had not caused any trouble, he said. In fact, sales for the first five months of the current year were ahead of last year. This period includes one full month since the squeeze began.

EMI

Although results for the year to 30 June include nine months' earnings from both Morphy-Richards and Ardente, pre-tax profit for the whole group has risen only from £5,348,000 to £5,448,000. As M-R and Ardente together contributed only £278,000 of this, it is clear where the trouble lies, though the parent company's earnings did edge back slightly. However, dividend is maintained at 17½% on the higher capital and is nearly twice covered.

KG (Holdings)

Dividend is raised from 32% to 35%, though profits do not equal the aggregate in the previous year of KG's earnings and those of Modern Engineering Developments, acquired a year before the latest balance date. Trading profit amounts to £355,385 as against £380,596.

Mann, Egerton

Arrangements for the private placing of debentures have been completed and directors now reveal the details. The issue comprises £750,000 of 6¾% 1981-86 stock.

Peebles-Belmos

Further details on the outlook for both Bruce Peebles and Belmos are given by Hambros Bank in a circular concerning the proposed merger. Bruce Peebles are feeling the benefits of expansion and reorganisation programmes and, although margins are still narrow, output is higher than last year and the improvement continues. Belmos expect a recovery in business during 1959 and 1960 to be reflected in the next accounts. Terms offered are 11 Bruce Peebles Ordinary shares of 10s each for every two Belmos £1 Ordinaries, and one 6½% £1 Preference for each 6% £1 Preference.

Pifco Holdings

Progress in five years from the sale of mining assets in Nigeria and the acquisition of Pifco Ltd., to being within sight now of paying off the last of the £510,000 deferred-cash element in the purchase price largely out of earnings and after paying substantial dividends, is a creditable management performance. The amount due to the vendors was reduced from £489,548 to £150,000 during the year to April, and it is intended to clear the remainder before 29 March next, when it would begin to incur interest. Now a one-for-one free issue of "A" Ordinary shares is to be made, and the chairman says turnover in the first four months of the current year shows a satisfactory increase.

Year to 30 Apr.	£ Trading Profit	£ Net Profit	% on Ord.		Ord. Price*	
			Earned	Paid	High	Low
1957	205,517	102,234	177·7	*Nil*	10/7	6/6
1958	207,027	96,831	168·4	20	17/10	9/-
1959	228,714	109,317	178·5	20	40/6	15/6
1960	217,753	115,534	188·6	30	43/3	33/9
1961	231,405	123,963	202·4	35	57/-	38/6

* Calendar year, except 1961 which is up to 17 Aug.

Plessey

The formal offer for ATE and Ericsson Telephones indicates that earnings were lower in the year to June 30, due to Government restrictions affecting TV and appliance business, but that they are expected to return to the former level in the current year. Group profits for 1960/61 are estimated to be not less than £4·1 million before tax, compared with £4,389,757 in the previous year. Net equity earnings are expected to be around £1,650,000 against £1,945,603 previously. As forecast, directors have also declared a second interim dividend of 8½%, making 17% for the year.

Dividends Announced

Cambridge Instrument. Third interim 4% (*same*).

Drayton Controls. Interim 7½% (*same*).

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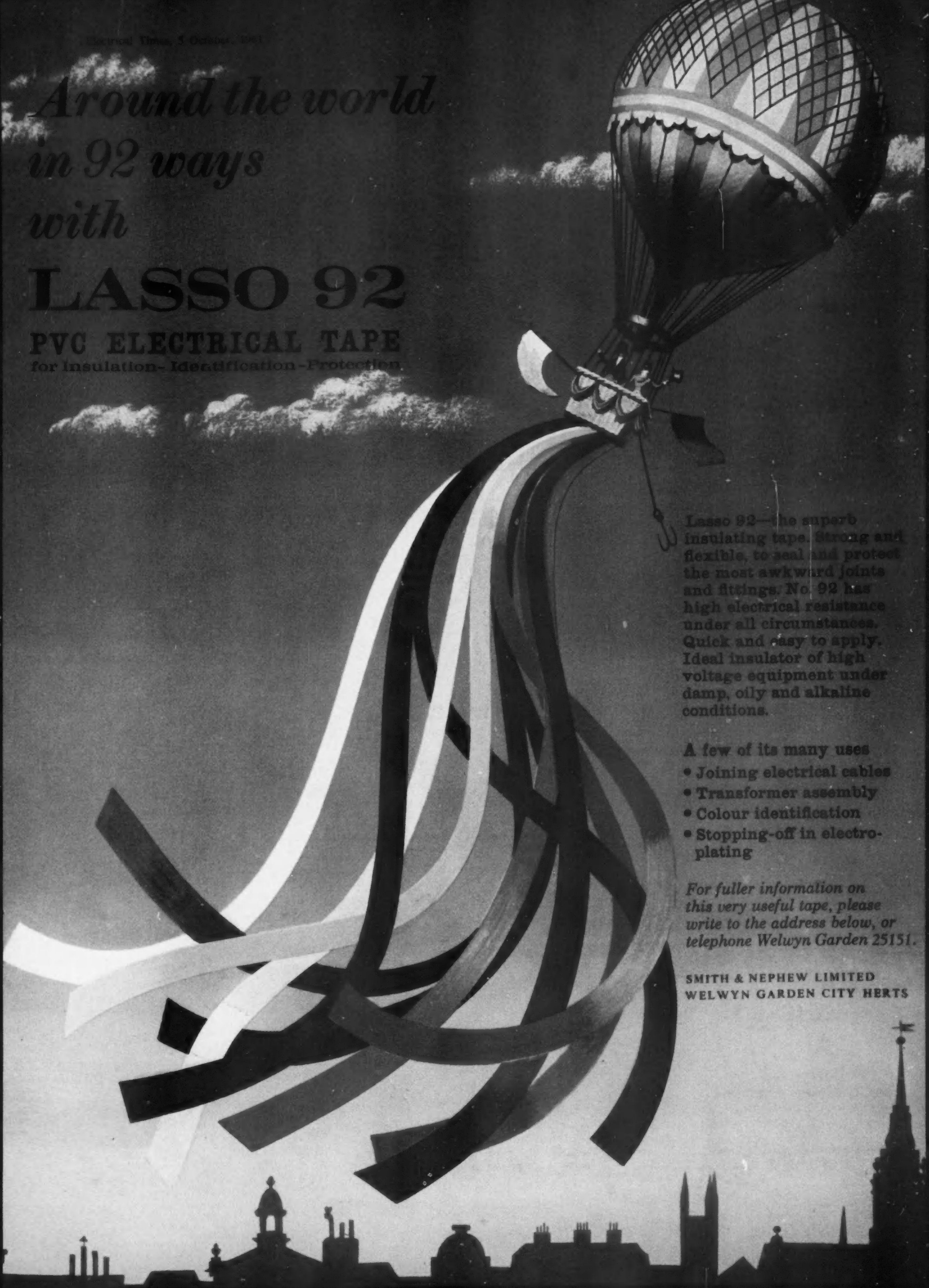
for insulation–Identification–Protection



Lasso 92—the superb insulating tape. Strong and flexible, to seal and protect the most awkward joints and fittings. No. 92 has high electrical resistance under all circumstances. Quick and easy to apply. Ideal insulator of high voltage equipment under damp, oily and alkaline conditions.

A few of its many uses

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For fuller information on this very useful tape, please write to the address below, or telephone Welwyn Garden 25151.

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WELWYN GARDEN CITY HERTS

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Many go into precision instruments—but whether the rest end up in something very hush-hush or not is rarely known to us.

But we have been making them for many years now; they range in size from 1·5 mm. o.d. upward. Some are made with open cups which allow clearance for spindle extensions, ranging from 0·25 upwards.

Full particulars and sizes are available on application.

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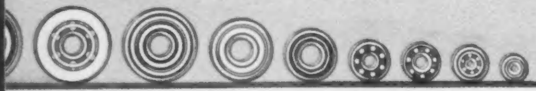
BELOW ARE
SOME OF THEM,
ACTUAL SIZE



MINIATURE BEARINGS

F·B·C
FAFNIR

REGD.
TRADE
MARKS:
FBC FAFNIR

OVERSEAS NEWS

from our correspondents abroad

CANADA

CGE Proposed Link

The Canadian General Electric Co. has made an offer for all the 625,000 shares of Dominion Engineering Works, of Montreal, and for the 62% interest held in Dominion Engineering by the Dominion Bridge Co. The offer by CGE is of one convertible Preferred share plus $3 cash for each DE share. The Preferred share would have a par value of $28 and carry a cumulative dividend of $1½/share annually, and be convertible one-for-one into CGE Common shares after these have been split 40-for-1. The directors of Dominion Engineering have recommended acceptance, for the combined facilities of the concerns would eventually enable the manufacture in Canada of the largest complete steam turbo-generator sets, which now have to be imported.

Plant Extension

The Consolidated Mining and Smelting Co. is to extend its Pend D'Oreille River hydro-electric plant, near Trail, BC, from its present 180 MW to 270 MW. The additional 90 MW generator has just been ordered from Canadian Westinghouse and is expected to go into service in 1963.

Fight Over Peace

The Peace *v.* Columbia wrangle continues! Now Justice Minister Fulton, chief Ottawa spokesman on the Columbia project, has virtually given warning to Premier Bennett of British Columbia that the Federal Government is considering all measures that will ensure the development of the Columbia project ahead of the Peace River scheme. If necessary the Navigable Waters Protection Act (which prohibits the construction of dams on any navigable water unless the Federal Government approves) can be invoked to achieve that end it is stated. Ottawa's view is that for the good of Canada and of BC, the Columbia project must get priority. It seems doubtful if Premier Bennett will quietly accept such a state of affairs—he has already appointed Mr R. M. Bibbs, former administration manager of the BC Electric's electrical division, as project manager for the Peace scheme.

EUROPE

Nuclear Station

Contracts have been placed for plant for the 242 MW nuclear power station to be built at Chooz, in the French Ardennes, which is to be owned and operated by a Franco-Belgian concern. Present plans are for the station to be built partly in the mountain side, where the pressurised water reactor will be sited, while the power generating equipment will be outside. Westinghouse are to provide the first core, but the second core is to be fabricated by Metallurgie et Mecanique Nucleaire, of Belgium. ACEC are also involved in supplying some of the plant.

EGYPT

Cairo Order

Confirmation of the £6 million contract for the Cairo South power station, to which we referred on 27 July last, has now been given by the English Electric Co., who are to be the main contractors and will co-ordinate the complete project. It is an extension of the existing station by the installation of two 60 MW steam turbo-alternators, together with four 441 klb/hr boilers (to be made by Simon-Carves Ltd.). English Electric will provide the sets, transformers, 63 kV switchgear, l.v. switchgear and fusegear. A £750,000 contract for the civil engineering work, additional to the EE contract, has been placed with Misr Concrete, of Cairo. The plant is scheduled for operation in 1964. Negotiations were protracted because the Egyptians wanted particularly long-term credits. Eventually, the company agreed to accept payment involving a share of the Egyptian cotton crop, the sale of which is being negotiated in Britain.

INDIA

Power Failure Report

The Calcutta Electric Supply Corporation is to install another 50 MW generating set, with the aim of having it in commission early in 1964. Approval has been given, in a change of attitude by the Government of India, following the power breakdowns earlier this year. This is revealed in the report of the Inquiry Committee which investigated the power situation in West Bengal and Bihar. The committee have also made several recommendations, among them being the proposal that the power requirements of the two States for the fourth Plan period should be assessed immediately, and that the new power plants required to meet that demand should be sanctioned by the end of 1962. The committee considers that unless this is done, the eastern region of India, containing the country's best coalfields and the largest industrial complex, will face an acute power shortage during the early years of the fourth Plan. They estimate that at the end of the third Plan, West Bengal will have a power shortage of at least 128 MW and Bihar of 45 MW. It is also suggested that there should be a full-time officer at the Ministry of Commerce to deal urgently with power plant requirements and expedite the procedure for clearing exchange and import licences.

PAKISTAN

Station Opening

Official opening of the Hyderabad thermal power station, and its associated grid lines, is to take place this week, President Mohammed Argub Khan performing the ceremony. The station, in which the first 5,000 kW gas turbine set began operating on 23 March, now has a capacity of 20,700 kW.

AUSTRALIA

Board of Inquiry

The Government of Tasmania has now set up the Board of Inquiry which is to consider and report on the comparative costs of power generation and matters affecting the Fingal Valley (we earlier reported the sustained agitation for siting of a thermal station there to save the coal-mining industry). Chairman is Mr A. McCulloch, who was chief engineer of the Southern Electricity Authority of Queensland. Among the other three members is Mr B. S. Woodfull, who retired from the post of city electrical engineer of Melbourne in 1957 and has since practised as a consultant to Preece, Cardew and Rider. The Board's terms of reference is to: (a) inquire into and report on the relative costs of generation by water power, thermal resources and other means; (b) consider and report on the relative costs of the different methods of generation as set out in reports published or made by the Electricity Commission of NSW, and by the Hydro-Electric Commission, and correlate this assessment to the social and economic problem of the Fingal Valley in particular and the State as a whole.

NEW ZEALAND

Interest in Distributors

A substantial interest has been acquired in the Wellington, New Zealand, electrical appliance distributors, H. W. Clarke (NZ) Ltd. by Email Ltd., the large Melbourne firm which already controls over 40 firms in the electrical and allied trades. H. W. Clarke Ltd., established in 1928, has nine branches throughout New Zealand. Email Ltd. have acquired the interest by an exchange of shares plus £50,000 cash provided for preference capital. H. W. Clarke (NZ) Ltd. hold the agencies for a large number of overseas firms, including the NZ sales rights of Westinghouse Electric International Ltd., of which Email Ltd. hold the manufacturing rights for New Zealand and Australia.

COMMERCIAL INFORMATION

Contracts Open at Home . . .

Dates given are the final for receipt of tenders unless otherwise stated.

6 Oct.—Dunbarton C.C. Supply of round steel columns: 30 of 25 ft, 155 of 15 ft and 229 of 10 ft 6 in. Supply of fluorescent lanterns: 30 with 3 x 80 W tubes; 134 with 2 x 40 W 2 ft tubes; 229 with 2 x 40 W or 4 x 15 W tubes for post-top mounting; 136 with 2 x 80 W or 2 x 13 W tubes (bulkhead type).—See 21 Sept. issue.

6 Oct.—Meath C.C. (b) Electrical installation in new vocational school at An Uaimh.—See 21 Sept. issue.

6 Oct.—N.I. Housing Trust. Electrical installations in 29 dwellings, Rampart St, Dromore.—See 28 Sept. issue.

6 Oct.—Ulster Transport Authority. Supply of (Contract 65) batteries and battery plates; (Contract 77) accessories, adaptors, plugs, switches, etc.; (Contract 78) p.v.c. and cotton sleeving.—See 21 Sept. issue.

9 Oct.—Bridgwater B.C. Supply and installation of 28 Group "A" concrete columns, eight Group "B" concrete columns together with lanterns and equipment; also supply and laying of 1,410 lin. yd underground cable. Deposit £2 2s. Engineer, Town Hall, Bridgwater.

9 Oct.—Ludlow R.D.C. Rewiring of nine houses, Ludlow Rd, Cloebury Mortimer.—See 28 Sept. issue.

9 Oct.—Manchester C.C. Electrical installation in fourth floor of Central Library.—See 21 Sept. issue.

9 Oct.—Perth and Kinross J.C.C. Electrical work in 27,250 sq ft Alyth Junior Secondary School alterations and additions.—See 28 Sept. issue.

9 Oct.—Southport C.B.C. Supply and installation of 30 twin fluorescent lighting fittings in abattoir, Poplar St.—See 28 Sept. issue.

9 Oct.—Staffordshire C.C. Provision of street lighting at Battlefield roundabout, Wombourn, on A449, comprising ten points using linear sodium lamps on steel columns. County Surveyor, County Bldgs, Stafford.

10 Oct.—N.I. Ministry of Finance. Electrical installation modification in Ministry of Commerce factory for U.K. Optical Co., Lurgan.—See 28 Sept. issue.

11 Oct.—Berkhamsted U.D.C. Applications for inclusion in select list No. 4 electrical work up to £3,000 in value to Engineer and Surveyor, Civic Centre, by above date.

11 Oct.—Durham C.C. Electrical installation in Consett Police Station. Applications to County Architect, South St, Durham, by above date.

11 Oct.—Manchester T.C. Electrical installations in 768 dwellings, Heywood (Contract 356); and in 42 dwellings, Butler St (Contract 352). Director of Housing, Town Hall, Manchester 2.

11 Oct.—Newtownards B.C. Supply and erection of two submersible pumps each for 142 g.p.m. at 130 and 260 ft heads, respectively, to be complete with pipework, valves, fittings, instruments and control gear. —See 21 Sept. issue.

12 Oct.—Maidstone B.C. Scheme P.W.10. Electrical installations in 72 flats and four bungalows.—See 28 Sept. issue.

12 Oct.—Northwich R.D.C. Supply and installation of 38 30 ft concrete columns/200 W sodium lamps/lanterns/gear along A49 at Cuddington.—See 7 Sept. issue.

12 Oct.—Sunderland C.B.C. Electrical installation in Town End Junior and Infants' Schools.—See 21 Sept. issue.

13 Oct.—Belfast C.C. Specification W.199. Supply/erection of v.h.f. fixed and mobile, frequency modulated, 25 kc/s channel spacing radio-telephone equipment.—Advertised 21 Sept. issue.

13 Oct.—Cardiff C.C. Erection contract 9: Erection of 1,180 Class "B" concrete columns complete with mercury fluorescent lanterns/gear on fixed-price basis.—See 28 Sept. issue.

13 Oct.—Crediton R.D.C. (1) Wiring of eight houses, 5-10 East End and 1-2 Oxford Sq, Poughill, and provision of washboilers. (2) Wiring and other modernisation work in eight houses, 1-4 East and West End, plus provision of washboilers.—See 28 Sept. issue.

13 Oct.—Fylde Water Board. Contract 149: Supply and installation of lighting and power supplies to pump house, Wyre La, Garstang. Contract 150: Supply and installation of lime dosing pump, pH control equipment pipework and wiring at Stocks Filter Hse, Slaidburn, Yorks.—See 21 Sept. issue.

13 Oct.—Midlothian C.C. Supply and erection of: ten 140 W, six 60 W and 111 45 W sodium lighting units on steel columns; conversion of 49 units to 60 W or 45 W sodium lighting and ancillary works at Polbeth and Limefield, West Calder.—See 21 Sept. issue.

13 Oct.—Whickham U.D.C. Provision of street lighting at Swalwell Bank, Dunston Bank and King George Ave, Dunston.—See 21 Sept. issue.

14 Oct.—Kenilworth U.D.C. Supply and erection of duplicate sewage pumps at Mill End. Engineer and Surveyor: G. A. J. Edmundson, Council Hse.

16 Oct.—Cardiff C.C. Electrical installation in Splott Pk Clinic. N.I.C. firms only.—See 28 Sept. issue.

16 Oct.—Down C.C. Electrical and lift installations in new H.Q. offices at 18 Windsor Ave, Belfast.—See 21 Sept. issue.

16 Oct.—Durham C.C. Fixed-price tender: Supply/erection/putting into service of 20 400 W mercury lighting on 25 ft steel columns at A177 roundabout near new County Hall, Aykley Heads.—See 28 Sept. issue.

16 Oct.—Forth Rd Bridge Joint Board. Heating of 11,000 sq yd of road in toll booth area of Southern Approach near Hopetoun crossroads. Installation to include automatic and manual control.—See 28 Sept. issue.

16 Oct.—N. Riding C.C. Lighting of A174 roundabout at Ormesby. — Advertised 21 Sept. issue.

16 Oct.—Port Talbot B.C. "Harry Site" street lighting scheme, Sandfields, Classes "A" and "B" lighting: 46 15 ft concrete columns and arms, 46 80 W chokes and condensers, 46 symmetrical type lanterns, 46 80 W mercury lamps, 25 200 W sodium lanterns, seven "Keep Left" signs. Borough Engineer, Municipal Bldgs, Port Talbot. Deposit £2 2s.

18 Oct.—Penybont R.D.C. Provision and erection of 50 100 W mercury fluorescent lamps and 20 60 W sodium lamps on concrete columns for various housing sites. Engineer and Surveyor, Penybont Offices, Coity Rd, Bridgend. Deposit £2 2s.

20 Oct.—Aberdare U.D.C. Supply and installation of 13 columns/lanterns on Maesgwyn Rd, Cwmdare.—Advertised 28 Sept. issue.

20 Oct.—Edinburgh C.C. Electrical installation, River Purification Offices, Springwell Hse. City Architect, City Chmbrs.

20 Oct.—Scunthorpe B.C. Rewiring of 226 houses on Crosby estate. N.I.C. firms only. See 28 Sept. issue.

23 Oct.—Down C.C. Electrical heating and lighting installation in Child Health Clinic and Library at Castlewellan. Details from consulting engineers: McCandless and Barton, 6 Murray St, Belfast. Deposit £2.

23 Oct.—West Riding C.C. Electrical installation in Divisional Office, 6 Victoria Rd, Barnsley.—See 28 Sept. issue.

25 Oct.—Manchester C.C. Electrical installation in new abattoir, Philips Pk.—Advertised 28 Sept. issue.

26 Oct.—Stokesley R.D.C. Contract 2. Duplicate air compressor and ejector plant for sewerage scheme.—See 28 Sept. issue.

27 Oct.—Belfast C.C. Specification W.200. Supply of 33/11 kV 7·5 MVA step-down transformers.—Advertised 28 Sept. issue.

1 Nov.—Bournemouth C.B.C. Supply of: (a) electrical industrial truck and charger; (b) electrical street cleansing truck and charger.—See 28 Sept. issue.

6 Nov.—Clowne P.C. Supply of (1) 115 25 ft tubular steel columns/brackets; (2) 115 140 W sodium Group "A" lanterns; (3) 115 140 W sodium lamps. Erection of columns.—Advertised 28 Sept. issue.

6 Nov.—Newtonabbey U.D.C. Supply and delivery 250 Group "B" fluorescent lanterns/lamps/control gear/concrete columns. Surveyor, Town Hall, Newtonabbey, Co. Antrim.

20 Nov.—E.B. for N. Ireland. Specification N.I.1640: power control and indication cables for No. 4 boiler, turbo-generator and associated equipment.—See 21 Sept. issue.

No date stated—Betwys-y-Coed U.D.C. 63 trunk road lighting columns with sodium lighting.—See 14 Sept. issue.

No date stated—East Lothian C.C. Electrical work comprising cabling and switchgear for

Your Queries Answered

Readers are invited to make use of our free enquiry department which possesses wide resources, including an index of trade information with over 100,000 entries

A Selection from the 112 queries answered this week

"Camplex" soil sterilizers—makers of? T.B.—Simplex Dairy Equipment Ltd., Sawston, Cambs.

"Dim-a-Lite" dimmers—agents for? A.L.—Honeywell Controls Ltd., Greenford, Middx.

De-scaling tools with vibratory needles—makers of? H.T.—Jasons (Equipment) Ltd., Windsor St, Chertsey, Surrey.

"Atlantic" refrigerators—address for? W.H.P.—H. J. Baldwin and Co. Ltd., Domestic Appliance Division, Baldwin Hse, 132 Arkwright St, Nottingham.

"Turret" trunking system—makers of? E.E.W.—Power Centre Co. Ltd., Lloyd St, Wednesbury, Staffs.

"Elektrohelios" cookers—agents for? T.E.—Helimatic Ltd., 22 Buckingham Palace Rd, S.W.1.

"Pacera" drilling machine control gear—address for? J.S.—W. J. Meddings Ltd., Ipswich Rd, Trading Estate, Slough, Bucks.

"Alba" Lamps—suppliers of? E.W.—British Luma Co-operative Electric Lamp Society Ltd., 95 Morrison St, Glasgow C.5.

"Lapp" insulators—address for? L.B.—Taylor Tunnicliffe and Co. Ltd., Eastwood, Hanley, Stoke-on-Trent, Staffs.

ANSWER WANTED

"Horbick" pot washing machines—makers of? T.B.—

three motors and lighting for workshop. Messrs Carter and Wilson, 51 Queen St, Edinburgh 2.

No date stated—Leeds. Floor-heating installation in new 5,000 sq ft premises.—See 21 Sept. issue.

No date stated—N. of Scotland H.E. Board. Three mile 132 kV single-circuit steel tower line in Argyll.—Advertised 31 Aug. issue.

No date stated—Southampton C.B.C. Supply and installation of dual fuel engines, alternators, switchgear and associated plant at Millbrook Sewage Wks.—See 21 Sept. issue.

. . . and Overseas

*Details of items marked * may be obtained on application to the Board of Trade, Lacon Hse, Theobalds Rd, W.C.1, quoting reference.*

10 Oct.—Pakistan. kWh, etc., meters (five items). Resident Representative WAPDA, Ebrahim Court, 2 West Wharf Rd, Karachi. B.o.T. (ESB/29132-3-4-5 and 6/61).* Closing date for 5 and 6 is 12 Oct.

11 Oct.—S. Africa. 25,000 ft conduit tubing, electrical thread ¾ in., to SABS specification 162/51. Secretary, Tender Board, S.W. Africa Administration, P.O. Box 27, Windhoek (ESB/29937/61).*

13 Oct.—Formosa. 5,000 street lighting control switches, 110 V, 3 A 60 c/s. Central Trust of China, Purchasing Dept., 68 Yen Ping Rd, Taipei, Taiwan. Job No. GFD-10655 (ESB/29871/61).*

15 Oct.—Lebanon. Supply of four links (eight terminal sets), each giving 12 telephonic channels on overhead lines; and four (eight terminal sets), each giving three or four telephonic channels on overhead lines. Directorate-General of Tenders, Immeuble Mansour, Salameh, Rue Chateaubriand, Beirut (ESB/30397/61).*

16 Oct.—Bolivia. Two 125 kW diesel generators for Guabira sugar refinery. Corporacion Boliviana de Fomento, La Paz. B.o.T. (ESB/25533/61).*

16 Oct.—Pakistan. 9,150 tubular steel poles or lattice transmission structures. Director, Stores, Electricity, WAPDA, Gardi Trust Bldg, Old Anarkali, Lahore. B.o.T. (ESB/29163/61).*

16 Oct.—Pakistan. 10,000 11 kV pin insulators for W.A.P.D.A. Details from R. E. B. Willcox and Co., 36 Gt. St. Helens, London E.C.3.

17 Oct.—Ceylon. 200 metering sets comprising polyphase kWh meter, kVA maximum demand indicator and three current transformers; 11 and 33 kV pin insulators. General Manager, Dept. of Government Electrical Undertakings, P.O. Box 540, Colombo. B.o.T. (ESB/28531 and 2/61).* Details from Crown Agents, 4 Millbank, S.W.1, references Q/EE1/Ceylon. Elec. Stores/484 and P/EE1/Ceylon Elect. Stores/483, respectively.

17 Oct.—Greece. Street lighting equipment, transformers and telephone apparatus. Offices of the Direction B State Purchases, 50 Socratous St, Athens. B.o.T. (ESB/29750/61).*

17 Oct.—Pakistan. 75, 150 and 250 kVA 3-ph. transformers. Director, Stores, Electricity, WAPDA, Gardi Trust Bldg, Old Anarkali, Lahore. B.o.T. (ESB/29162/61).*

20 Oct.—Argentina. Supply and installation of transformer substation, 13·2 kV to 66 kV, in Pehuajo. Calle 6, No. 636, La Plata, Provincia de Buenos Aires (ESB/29986/61).*

21 Oct.—Ceylon. 1·1 and 11 kV cable (12 items). Crown Agents, 4 Millbank, S.W.1. B.o.T. (ESB/29762/61).*

22 Oct.—Iraq. Armature wire. Purchase and Tender Office, Iraqi Ports Admin., Basrah. B.o.T. (ESB/29783/61).*

22 Oct.—Iraq. Six mobile diesel generators. Purchase and Tender Office, Iraqi Ports Admin., Basrah. B.o.T. (ESB/29798/61).*

23 Oct.—Australia. Two 100 kW automatically controlled indoor rectifier units. State Electricity Commission of Victoria, 22-3 William St, Melbourne (ESB/29921/61).*

24 Oct.—Ceylon. 11 and 33 kV drop-down fuse units. Chairman, Tender Board, Ministry of Agriculture, Land, Irrigation and Power, P.O. Box 500, Colombo. B.o.T. (ESB/28885/61).*

24 Oct.—New Zealand. Ten 750 kVA 3-ph. distribution transformers. Town Clerk, P.O. Box 2199, Wellington C.1. B.o.T. (ESB/29804/61).*

25 Oct.—Egypt. Machines and equipment for electrical training centre; machines/instruments, general electrician shop; machines/instruments, motor generator shop; instruments/materials/machines, for radio and TV; demonstration equipment and hand tools for radio and TV and an electrical laboratory. Stores and Supply Dept., 3 Sharia Aboul Fetouh, Ismail, Dokki, Cairo. B.o.T. (ESB/29994/61).*

25 Oct.—Kuwait. 2,500 window type air conditioners. President, Dept. of Electricity, Water and Gas. B.o.T. (ESB/29707/61).*

25 Oct.—New Zealand. One static power invertor to provide "no-break" supply to telecommunication equipment fed from 24 V battery to provide continuous operation, 230 V 50 c/s. Director-General (Stores Divn.), G.P.O., Wellington (ESB/29900/61).*

31 Oct.—Argentina. Electrification network, 13·2 kV, in Bahia Blanca area. Calle 6, No. 636, La Plata, Provincia de Buenos Aires (ESB/29987/61).*

31 Oct.—Egypt. One circuit-breaker, isolating switches, current transformers and supporting structures for 63 kV main power transformer; one indoor type 10·5 kV switchgear, with control, metering and protective equipment. Director-General, Cairo Electricity and Gas Administration, 53 Avenue 26 July, Cairo (ESB/29994/61).*

CONTRACTS PLACED

Braintree and Bocking U.D.C. Wiring of 56 houses at Wheatley Ave, Claude Harvey Ltd., £2,008.

East Anglian Hospital Board. Work in medical unit, Northgate Hospital, Gt. Yarmouth; electrical, Eastern E.B., £9,210; lift, Evans Lifts Ltd., £3,165.

Glasgow C.C. Electrical work in 104 houses, one shop and garages in Phase I (Northern Section), Ladywell Hsg Scheme, J. Kilpatrick and Son Ltd., £24,770; electrical installation in fire station at Easterhouse, W. C. Martin and Co. Ltd., £4,762; supply of 1,500 cookers, Falkirk Iron Co., £30,412; supply of cookers, Simplex Electric Co., £29,250. Recommended.

Lancs C.C. Rewiring work: Droylesden Fairfield High School for Girls, J. Scott and Co. Ltd., £4,899; Whitefield Stand Boys' Grammar School, Wainwrights (Electrical) Ltd., £7,281; Ramsbottom County and County Secondary Schools, C. Richardson and Sons Ltd., £4,851; Barrowford County and County Secondary Schools, E. Dewhurst Ltd., £4,761; Urmston Grammar School, J. Scott and Co. Ltd., £7,343; Eccles Grammar School and electrical installation reorganisation in laboratories, E. M. Evans & Son Ltd., £5,296 and £1,165 respectively. Recommended.

Poplar B.C. Electrical work in block "J," Newby Pl, Electric Contracts (London) Ltd., £2,920; Lighting and power installation. Bow Library, London Electricity Board, £401. Recommended.

Gazette Announcements

COMPANIES ACTS

Durham Electrical (Wholesalers) Ltd. Meeting of creditors, Bonnington Hotel, Southampton Row, W.C.1, 3.30 p.m., 18 Oct.

Radiomestic Appliances Ltd. Meeting of creditors, 1 John St, Bedford Row, W.C.1, 3 p.m., 12 Oct.

Broadwater Electrical and Radio Ltd. Final meetings at offices of W. H. Cork, Gully and Co., 19 Eastcheap, E.C.3, 27 Oct. Members, 11.30 a.m.; creditors, 12 noon.

BANKRUPTCY ACTS

Receiving Orders

Durham. Viking Electrics, electrical dealers, "A" Warehouse, Shildon Railway Station. Order dated 19 Sept.

Sheffield. B. J. L. Page, domestic electrical appliance retailer, carrying on business at 77 Cleveland St, Doncaster. Order dated 22 Sept.

Public Examinations

Barrow-in-Furness. A. Whittall, electrical dealer, of 25 Collingwood St. Public examination: 2.30 p.m., 26 Oct., at Magistrates' Court, Duke St, Barrow-in-Furness.

Northampton. S. and E. Electrical, electrical dealers, formerly carrying on business at 23 Greyfriars St, Northampton. Public examination: 10.30 a.m., 27 Oct., at County Hall, Northampton.

High Court of Justice. F. Mielniczek, domestic electrical equipment dealer, formerly carrying on business at 261 Eversholt St, N.W.1. Public examination: 11 a.m., 10 Nov., at Bankruptcy Bldgs, Carey St, W.C.2.

Appointment of Trustee

Sheffield. J. T. Barnes, confectioner and domestic appliance retailer, of 153-5 Marshland Rd, Moorends, Thorne. Mr S. D. Moore, 4 Silver St, Hull, appointed trustee from 21 Sept.

Release of Trustees

Bristol. G. S. R. Maggs, formerly carrying on business as GMC Electrical Co., 3 Regent St, Clifton. Mr G. W. Sisman, trustee, released from 21 Sept.

Hertford. H. A. Simmons, electrical retailer, formerly carrying on business at 14 Castle St, Bishop's Stortford, as S. and C. Supplies. W. Whitehead, official trustee, released from 21 Sept.

TRADE NOTES

Changes of address. The Newcastle upon Tyne area sales office of Alcan Industries Ltd., formerly Northern Aluminium Co. Ltd., has moved to new premises at Newgate Hse, Newgate St, Newcastle upon Tyne. The new telephone number is 22107.

Euco Tools Ltd. have moved to Armfield Close, Industrial Estate, West Molesey, Surrey. Telephone: Molesey 2066.

The Glasgow branch of the Reliance Telephone Co. Ltd. is now at 123-145 North St, Glasgow C.3. Telephone: Central 7377.

Licence agreement. Birwelco Ltd. have made an exclusive agreement with Yuba Consolidated Industries Inc., of Oklahoma, to make and sell Aimco Transaire air-cooled heat exchangers in Europe and the British Commonwealth.

Glasgow branch. S. N. Bridges and Co. Ltd. are opening a branch at 52 West Nile St, Glasgow C.2, on 9 Oct.

Starters. The motor starter business of Fred. W. Davies and Son, of Huddersfield, has recently been registered in the name of the present proprietor, Mr Ronald K. Davies, who is continuing the business.

Extension. Chloride Batteries Ltd. are in process of extending their Swinton works by the addition of a new building to house a rotary furnace and ancillary equipment, including a 20-ton overhead crane, just ordered from Matterson Ltd.

U.S. agreement. Elcontrol Ltd. have concluded an agreement under which their products will be made and sold in the U.S. and Canada by Siegler Corporation Magnetic Amplifiers Division, of New York.

BUSINESS PROSPECTS

Aldershot. War Dept. plan rebuilding barracks, Stanhope Lines, to cost about £1 million.

Ashford. Factory proposed for Chenudus Ltd., to plans by Norris Consultants Ltd., 36 Victoria St. S.W.1.

Ashton-in-Makerfield U.D.C. Tender: 110 dwellings, Low Bank Rd estate; Surveyor.

Bedford. W. H. A. Robertson and Co. Ltd., Lynton Wks, propose major expansion of the Ampthill Rd Wks to cost £1,500,000.

Berks. C.C. propose £165,000 new county modern school, Newbury; County Architect, Reading.

Birkenhead. Proposed: 14 shops and supermarket with 11 flats, Woodchurch, for Sir Robert Lloyd and Co. Ltd., Bromborough.

Birmingham. Proposed: £100,000 office/warehouse block, Loveday St, by J. Gilman and Son Ltd., 44 Stafford St. £150,000 office block at Kingsbury Rd, for Yarwood Ingram and Co. Ltd., 37 Parker St. £1 million contract placed by University for 20-storey block of Halls of Residence. £1,200,000 contract placed for new Dental Hospital at St. Mary's Row, for United Birmingham Hospitals; contractors for all projects: C. Bryant and Son Ltd., Whitmore Rd, Birmingham 10.

Bo'ness. Factory proposed on ten acres of land east of Bo'ness by Smith Bros. (Quinton) Ltd., Titford Rd, Langley, near Birmingham.

Brighton. Planned: factory, Shanklin Rd, for C.B.R. Jersey Mills Ltd., Shanklin Rd.

Bristol. Planned: new store to cost £308,219, at Horsefair, for Littlewoods, of Liverpool: contractors: Griggs and Son Ltd., 56 Victoria St, S.W.1.

Bromley B.C. Tender: 100 dwellings, Burnt Ash La; Engineer.

Burscough. Factory development, Liverpool Rd North, proposed for Vitax Ltd., Liverpool Rd North.

Bury. Brunswick Bowling Ltd plan bowling centre and club; cost: £300,000.

Cardiff. Hall of residence, Llanedeyrn, proposed for Welsh College of Advanced Technology; plans by City Architect, Greyfriars Rd.

Chatham. Southwick Diocesan Schools Commission plan St. John Fisher R.C. school; quantity surveyors: Davis, Belfield and Everest, 21 Ashley Pl, S.W.1.

Cheadle and Gatley. Norman Sinclair (Properties) Ltd., Denmark Rd, W.13, propose development of a five-acre site, Station Rd/Ladybridge Rd, Cheadle Hulme.

Chichester C.C. Tender: replacement of sewage pumping machinery/control gear, Mill La station; Engineer.

Colne B.C. Tender: 94 Lob Common dwellings. Engineer.

Daventry. Chowns Ltd., Northampton, propose 230 dwellings, The Inlands.

Devizes. B.C. propose 60 houses, 84 flats, 11 bungalows, Caen Hill; Surveyor.

Dukinfield B.C. Tender: 200 traditional dwellings, Yew Tree La estate; Housing manager.

Durham. C.C. obtaining tenders for electrical installations, Consett police station; County Architect, South St, Durham.

Essex. C.C. placed £81,600 contract with L. and S. Builders (Brentwood) Ltd., 36 Cromwell Rd, Brentwood, for hostel for elderly people, Harold Hill, Romford.

Exmouth. Proposed: factory, Redgate site, Salterton Rd, for C. and J. Clark Ltd., Street, Somerset.

Fife C.C. Tenders: 85,000 sq ft Beath High School, Cowdenbeath, and 84,400 sq ft Balwearie Secondary School, Kirkcaldy. Clerk, County Bldgs, Cupar.

Folkestone. War Dept. plan redeveloping most of Moore Barrack area, Shorncliffe Camp; cost: £1,250,000.

Frinton and Walton. Proposed: holiday village, nr. Naze Links estate, Walton-on-Naze; cost: £2 million; plans propose an 80-bedroom hotel, 350 houses, 400 beach huts, shops; proposer: Godfrey Evans.

Glasgow. The Western Regional Hospital Board, 64 West Regent St, C.2, propose 135-bed neuro-surgical unit, Southern General Hospital; cost: £500,000. Extensions, Cadogan St, proposed by Scottish Daily Record and Sunday Mail Ltd., 67 Hope St, C.2.

Glendale. R.D.C. propose 20 dwellings, Golden Sq, Wooler; Surveyor.

Glenrothes. D.C. propose first phase of town centre development, with 46 shops; Corporation Architect: Peter Tinto, Woodside, Glenrothes.

Greenwich M.B.C. Tender: 116 dwellings, Haddo St; Engineer.

Hamilton B.C. Tender: 94 Udston-Hillhouse houses. Architect.

Hartlepool. Factory, 20,000 sq ft, proposed, trading estate, for Ambrose Shardlaw and Co., Meadowhall, Sheffield.

Hartley Wintney. R.D.C. propose 20 houses, Manor Pk, Yateley; Engineer.

Hastings. Planned: factory, Windmill Ave, for Hammond Bros., Upper South Rd, St. Leonard's.

Hayes. Extensions proposed by British Electric Transformer Co. Ltd., Clayton Rd; architects: Adie, Button and Ptnrs., 7 Carlos Pl, W.1.

High Wycombe. Factory proposed for E. M. F. Brown Ltd., Duke St; architects: Thurlow, Lucas and Janes, 86 Easton St.

Kingsclere and Whitchurch. R.D.C. propose residential development of 1½ acres, Mount Pleasant, Tadley; Surveyor, Kingsclere.

Leeds. Proposed: £700,000 development at the City of Leeds Training College, Becketts Park; contract placed with F. Shepherd and Son Ltd., Blue Bridge La, York.

Liverpool. Factory, St. James St, proposed for Bradley's (Chester) Ltd., Chester.

London. United Dairies Ltd., Superity Hse, Western Ave, W.3, propose research laboratory, Western Ave. Shops and flats proposed, Lea Bridge Rd, E.8; architects: J. Mendlesohn and Ptnrs., 71 Wimpole St, W.1. Planned: new office block to replace Salisbury Sq Hse, off Fleet St, E.C.4, for the Prudential Assurance Co., Holborn Bars, E.C.1. Proposed: office building on island site of 25 New St Sq, off Fetter La, E.C.4, for Wyman and Sons Newspaper Hse, Fetter La, E.C.4; architects: H. M. J. Bebb, 23 Maddox St, W.1. Proposed: office building, Fetter La and Breams Bldgs, E.C.4, for Hallmark Securities Ltd., 9 Wimpole St, W.1; architects: R. Seifert and Ptnrs., 34 Red Lion Sq, W.C.1. Office block, Wellington Rd, St. John's Wood, N.W.8, proposed; cost: £150,000; quantity surveyors: Thompson and Alexander, 6 Cromwell Pl, S.W.7. Contract placed with Truscon Ltd., 35 Lower Marsh, Lambeth, S.E.1, for new station and office block at Lambeth North underground station, Westminster Bridge Rd.

Manchester. Manchester and Dist. Fed. of Boys' Clubs plan six new clubs and to rehouse four existing ones at a cost of £200,000. Nathan Brown Estates Ltd., 67 Wellington Rd South, Stockport, propose 11-storey block of flats, Platt La, Rusholme.

Merthyr Tydfil. B.C. inviting tenders by 2 Oct. for home for 40 persons, Gurnos estate; Borough Architect.

Midlothian. C.C. plan 17 factories, Loanhead, ranging in size from 3,000 to 5,000 sq ft floor space.

Newbiggin U.D.C. Tender: 114 dwellings, Moor housing estate; Surveyor.

Newbury. B.C. propose 114 houses and 24 flats in next year; Engineer.

Newcastle. John T. Bell and Sons, Market St Chmbrs, propose 300 luxury flats in three blocks, Jesmond Dene.

Oban. Scottish Marine Biological Assocn., Keppel, Millport, Isle of Cumbrae, propose site in Oban for new marine biological laboratory.

Penrith. Border Eng. Contractors Ltd., 125 Queen St, Whitehaven, propose 95 houses, Wetheriggs estate. Planned: factory extensions, Gilwelly industrial estate, for Gush and Dent.

Portsmouth. C.C. propose six-storey block of 54 flats, Green Rd/Elm Grove, to cost £199,000, 204 dwellings, Hyde Park Rd area; City Architect.

Preston C.B.C. Tender: 141 Ingol dwellings. Engineer.

Queensferry. Hotel/motel/houses proposed on new Forth Rd, South Queensferry, by Hopetoun Estate Dev. Co., Elvanfoot, Abington.

Redcar B.C. Tender: 24 shops/flats, Lakes Neighbourhood centre; architects: F. Gibberd, 19 The Rows, Stone Cross, Harlow.

Redhill. An office block proposed to plans by S. W. Higgins, architect, 70 Upper Richmond Rd, S.W.15.

Richmond. Planned: 98 flats, The Popiary, for Master Flats Ltd., 8 Berkeley St, W.1; architects: J. Keable and Ptnrs., 54 Great Marlborough St, W.1.

Rotherham C.B.C. Tender: 89 Laudsdale Rd flats. Engineer.

Rothwell U.D.C. Tender: 42 Town St (East) Carlton dwellings. Architects: R. A. Easdale and Son, 12 Wesley St, Castleford.

Scunthorpe. Divn. Executive inviting tenders for new John Leggat grammar school to cost £298,375, at West Common La.

Southampton. B.C. propose Bellmoor secondary boys' school to cost £245,893; Architect.

Southend. Proposed: factory/offices for M.K. Electric Ltd., Shrubbery Rd, N.9; contractors: W. T. Yates Ltd., 198 Great Cambridge Rd, Enfield.

Southwick. Planned: extensions to factory for Ericsson Telephones Ltd., North Hylton Rd.

Stockton. British Titan Products Ltd., Billingham-on-Tees, will adapt factory, Stockton, for research and technical service department.

Stourbridge. Feoffees of Oldswinford Hospital School propose major scheme of extensions to school.

Sunderland. Durham Div. Coal Board plan five-storey office block at Thornhill Park; architects: G. T. Brown and Son, 14 Grange Terr, Stockton-on-Tees.

Surbiton. High Speed Service Tool Co. Ltd., 86 Maple Rd, propose to rebuild premises, St. James Rd.

Watford. Westminster R.C. Diocese propose primary school, Garston; architects: Archard and Ptnrs., 20 Lowndes St, S.W.1.

Westerhope. R. Turley and Assoc., 46 Jesmond Rd, Newcastle, architects for Greensitt Bros. proposed development, Ponteland. Scheme for shops/offices/flats.

West Suffolk. C.C. is obtaining tenders by 3 Nov. for home for aged, Place Farm, Haverhill: County Architect, Westgate St, Bury St. Edmunds.

Whickham. U.D.C. propose swimming pool, Dunston; architects: Fennell and Baddiley, Bridge End Chmbrs, Chester-le-Street.

Widnes B.C. Tender: 140 maisonnettes, Ditton area. Architect.

Winsick. F. Clifton Ltd., Dronfield Woodhouse, Chesterfield, propose 176 dwellings, Mansfield Rd.

Wisbech. Murkett Bros. Ltd., Norwich Rd, propose new car showrooms/service station/workshops, etc.

Woldingham. Proposed: extensions to cost £70,000 at Convent of the Sacred Heart; contractor: F. G. Minter Ltd., 4 Buckingham Gate, S.W.1.

Worthing. Heavon Holdings Ltd, propose 12-storey block of flats, together with seven- and four-storey blocks, Heene Rd; architects: Goldsmith and Pennells, 13 Liverpool Gdns, Worthing; cost between £300,000-£350,000.

Wortley R.D.C. Tender: 54 traditional dwellings, Piece End, High Green; Surveyor, Grenoside, Sheffield.

Wrexham. Welsh Hospital Board propose £5,000 electrical modernisation scheme for Wrexham War Memorial Hospital.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons Ltd., 116 Chancery La, W.C.2.

Bemec Instruments Ltd., 54 Victoria Rd, Surbiton, Surrey. To carry on business of electronic, mechanical, electrical and general engineers, etc. Nom. cap.: £100. Dirs.: Pablo S. Chaves and Maurice A. Fry.

Busfirm Electrical Ltd. Nom. cap.: £100. Dirs.: to be appointed by subs. Subs.: Jean Herbert and Thos. A. Herbert, 156 Strand, W.C.2.

Cambion Electronic Products Ltd., 301 Glossop Rd, Sheffield. Nom. cap.: £5,000. Dirs.: Frank Lyman, Lowell L. Wilkes and Lawrence L. Maitland.

C.N.B. (Bristol) Sales and Installations Ltd., 8 Pembroke St, Brunswick, Bristol 2. Dealers in electrical equipment and goods of all kinds, etc. Nom. cap.: £1,000. Dirs.: Colin V. W. Coveney, Geoffrey A. Mathias and Trevor J. Brown.

Commendable Electrics Ltd., details similar to:

Current Electrics Ltd., 6 Surrey St, W.C.2. Nom. cap.: £100. Dirs.: to be appointed by subs. Subs.: Stanley H. Lucas and Francis A. Dean.

Fazeley Enterprises Ltd. To carry on the business of electricians, etc. Nom. cap.: £3,000. Dirs.: Thomas H. Carr and Margaret Carr, 321 Alfreton Rd, Sutton Ashfield; and Robert Y. Mennell.

Ferro-Mag (Electrical) Ltd., 177 Regent St, W.1. To carry on the business of electrical and electronic engineers, etc. Nom. cap.: £500. Dirs.: Alfred W. Smith and Janusz Wyspianski.

Francis L. Flinn Ltd., 35 Bishop St, Coventry. To carry on the business of electrical engineers, etc. Nom. cap.: £1,000. Dirs.: Francis L. Flinn and Doris Flinn.

G.E.C. (Electronics) Ltd. Nom. cap.: £100. Dirs.: to be appointed by subs. Subs.: D. M. Vickers and H. J. Bond, Magnet Hse, Kingsway, W.C.2.

G.E.C. (Engineering) Ltd.

G.E.C. (Research) Ltd.

G.E.C. (T. and E.) Holdings Ltd.

G.E.C. (Telecommunications) Ltd. Other details are similar to G.E.C. (Electronics) Ltd.

Industrial Communications and Electrical Co. Ltd., 15 Dalment Rd, Westwood, Coventry. Nom. cap.: £100. Dirs.: Kenneth B. Sanders, Mrs Eunice E. Sanders and Mrs Morwena M. Hughes.

Kempston Electrical Co. Ltd. To take over business of manufacturing electrical engineers and electrical dealers carried on by Kempston Electrical Co. Ltd., etc. Nom. cap.: £30,000. Dirs.: not named. Subs.: P. R. Ward and A. L. Boyce, 18 Austin Friars, E.C.2.

Knowles Electronics Ltd., Moor Hse, London Wall, E.C.2. Nom. cap.: £25,000. Dirs.: to be appointed by subs. Subs.: Knowles Electronics Inc., A., and Hugh S. Knowles and James E. Knowles.

J. T. Lane and Co. Ltd., 384 Hoe St, Walthamstow, E.17. To carry on the business of electricians, electrical contractors, electrical engineers, etc. Nom. cap.: £100. Dirs.: Thomas J. Lane, Frederick W. Hilson and Alfred E. F. Foster.

P. and P. Electrics Ltd., 77 Carolgate, Retford, Notts. To take over the business of D. Parkinson, and to sell, hire and service sewing machines and other domestic appliances, etc. Nom. cap.: £500. Dirs.: Denis Parkinson and Kathleen B. Parkinson.

Pluton Electric Furnaces Ltd. Nom. cap.: £500. Dirs.: to be appointed by subs. Subs.: David B. J. Stevens, 5 Birkbeck Rd, Sidcup; and John S. Camp.

Reid and Co. (Electrical) Ltd., Everton Hse, Water St, Abergele, Denbighshire. To carry on the business of electrical engineers, etc. Nom. cap.: £1,000. Permanent dirs.: Charles H. Reid and Elwyn Williams.

Romagna Reproducers Ltd., 33 King St, E.C.2. Electronic apparatus manufacturers and dealers, etc. Nom. cap.: £2,000. Dirs.: Stanley Kelly and Mrs Betty Kelly.

Shereton Electronics Ltd., 5 Tremlett Mews, Tremlett Grove, N.19. Nom. cap.: £100. Dirs.: Jean Murphy, Hannah S. Daniels and Charles Levine.

Shipton Automation (Sales) Ltd. Dealers in electronic and electrical apparatus and equipment of all kinds, etc. Nom. cap.: £100. Dirs.: to be appointed by subs. Subs.: Stella Allen and Mary K. Salter, 59-67 Gresham St, E.C.2.

Simon-Carves (Export) Ltd., Bird Hall La, Cheadle Heath, Stockport, Ches. To carry on the business of mechanical, chemical or nuclear engineers, etc. Nom. cap.: £100. Dirs.: Leslie Dobson, Anthony J. Payne, Frank P. C. Coker, Jack D. Knox, James H. Magill, Ronald F. Orme, Burnett D. Willson and Charles L. Thorpe.

Tack Consultants Ltd., Tack Hse, Longmoore St, S.W.1. Nom. cap.: £100. Dirs.: George Tack and Alfred Tack.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Aerotan. 821,859. Class 9. Electrolytic capacitors. Aerovox Corpn., Belleville Ave, New Bedford, Massachusetts, U.S.A.

Atlas Trufocus. 800,683. Class 11. Lamp bases, holders and sockets. Thorn Electrical Industries Ltd., 105-109 Judd St, W.C.1.

Courier. 822,326. Class 8. Shavers, etc. Kent Kordless Ltd., 106 Edmund St, Birmingham 3.

Granadafon. 812,858. Class 9. Induction communication apparatus. Granada Group Ltd., 36 Golden Sq, W.1.

Icarus. 823,746. Radar reflectors. A. C. Cossor Ltd., Cossor Hse, Highbury Grove, N.5.

Indox. 815,891. Class 9. Ceramic magnets. Indiana General Corpn., 405 Elm St, Valparaiso, Indiana, U.S.A.

Nimbus. 817,261. Class 11. Lighting fittings, etc. **Falcon.** B818,463. Class 11. Fans, etc. The General Electric Co. Ltd., Magnet Hse, Kingsway, W.C.2.

Phonomatic. 819,697. Class 9. Dictating machines and control apparatus, etc. Pullman Business Machines Ltd., 29-37 Goswell Rd, E.C.1.

Prova. 812,298. Class 9. Wire, irons, utensils, etc. 812,297. Class 11. All goods. 812,294 and in design 812,364. Class 17. Insulating materials. British Home Stores Ltd., 129-137 Marylebone Rd, N.W.1.

Radatar. 821,667. Class 9. Apparatus for the handling and processing of radiolocation and speed signal information. Marconi's Wireless Telegraph Co. Ltd., English Electric Hse, Strand, W.C.2.

Redimeter. B803,848. Class 9. Meters. Central Rediffusion Services Ltd., Carlton Hse, Lower Regent St, S.W.1.

Silafon. 815,787. Class 9. Scientific and electrical apparatus and instruments, etc. Siemens and Halske Aktiengesellschaft, Wittelsbacherplatz 2, Munich 2, Germany.

Summit. 793,615. Class 9. Clock connectors, rubber connections and sockets, soldering irons, saucepans, kettles, etc. Edmundsons Electrical Wholesalers Ltd., 240-250 Ferndale Rd, S.W.9.

Tetra Finrod. B817,963. Class 11. Heating elements. Tetra Eng. Co. Ltd., Tetra Wks, North End Rd, Wembley.

Tramiac. 806,770. Class 9. Apparatus and instruments, etc. Aktiebolaget Hagglund and Söner, Ornskoldsvik, Sweden.

Triplanta Thermopad. 813,357. Class 11. Heated wall, floor and ceiling panels and mats, etc. Triplan Thermal Acoustics Ltd., Cromford Hse, Cromford Court, Manchester 4.

W in design. 820,597. Class 7. Washing machines, drying machines, etc. 820,598. Class 9. Irons, vacuum cleaners, etc. Whirlpool Corpn., 300 Broad St, St. Joseph, Michigan, U.S.A.

Hackbridge Holdings Ltd.

THE 13th Annual General Meeting of Hackbridge Holdings Ltd. was held on 28 September, in London, Mr A. L. Foulger (the chairman) presiding.

The following is a summary of his circulated statement for the year ended 31 March, 1961:

Much emphasis has already been placed upon the exacting competition in the Electrical Industry, and although our volume of output was well maintained, profit margins were reduced. The results achieved were not unexpected, and I hope you will agree that they are not unreasonable having regard to relevant circumstances.

I am glad to report that the new acquisitions referred to in my last report have operated successfully.

Your Board consider that there are great possibilities for expansion within our present Group of Companies. Nevertheless this view should not preclude the acquisition of any sound proposition which would ultimately benefit our organisation.

During the year we established a new company, Kelvin Metal Industries Limited, which is engaged in metal fabrication for the Group and other customers; this venture should prove a valuable asset.

The Group trading profit before providing for depreciation was £299,969 compared with £301,140. Provision for taxation absorbs £115,667—a considerable burden, exceeding 65% of our profits after charging depreciation of £123,452.

Capital expenditure during the year amounted to £72,287. Modernisation and improvements to our manufacturing technique, the expansion of production, and the introduction of new lines require continued capital expenditure.

We are constantly seeking to introduce additional manufactures in order to further diversify our range. The Group has played an extremely important part in the introduction and development of Air-Cooled Mining Type Transformers in this country and substantial business has resulted.

The Group commenced the current year with extensive order books and to date the demand for our products has been encouraging.

Judging by our experience so far in the current year we may look forward once more to quite satisfactory results.

The report was adopted and the final dividend of 7½% making 10% for the year was approved.

ELECTRICITY

Another successful year and a tremendous growth in demand

Sales of Electricity and the Financial Surplus

The actual figure of surplus was £16.3 million, some £10 million less than the year before, due mainly to higher costs. Another reason was a fall of about 2 per cent in the average price per unit; this was because, through the operation of two-part or block tariffs, the average price to most consumers falls as their consumption rises.

Sales of electricity were more than 12 per cent up on the previous year—greater than had been foreseen—but all demands had been met in full. However, this unexpectedly large growth in demand needed to be given special consideration when the industry was making its annual review of new construction programmes.

The Chairman went on to say that the trend in sales promised well for the nation. The use of more electricity meant greater productivity in industry, agriculture and commerce, and a higher standard of living generally. But the country should understand that a very heavy programme of capital expansion would be needed to keep up with the demand. This called for investment on an increasing scale.

How Much Capital?

Sir Robertson referred to the long-term capital development plans drawn up by the industry each year and kept under constant review. In 1958 it had become necessary to obtain increased borrowing powers. The plans at that time showed that £2,130 million of capital expenditure would be needed (at 1958 price levels) over the seven years to March, 1965. With regard to borrowings up to the end of that period, Parliament raised the ceiling of the industry's borrowing powers from £1,400 million to £1,800 million or whatever higher figure, up to a limit of £2,300 million, might be allowed by the Minister of Power with the approval of the House of Commons. At the end of March, 1961 the total borrowed stood at £1,624 million. The Electricity Council would soon be seeking permission therefore to proceed to the next stage of borrowing.

Self-Financing

So much for borrowing. The next question was; how much should the consumer contribute? When the seven-year programme was prepared in 1958 it was envisaged that depreciation provisions, surpluses and other internal resources would provide about 48 per cent of the total capital required. This proportion seemed to strike a reasonable balance between the consumers' interests and the need to limit borrowing.

Sir Robertson drew attention to the following table showing how closely actual results had compared with estimates over the first three years of the seven-year programme.

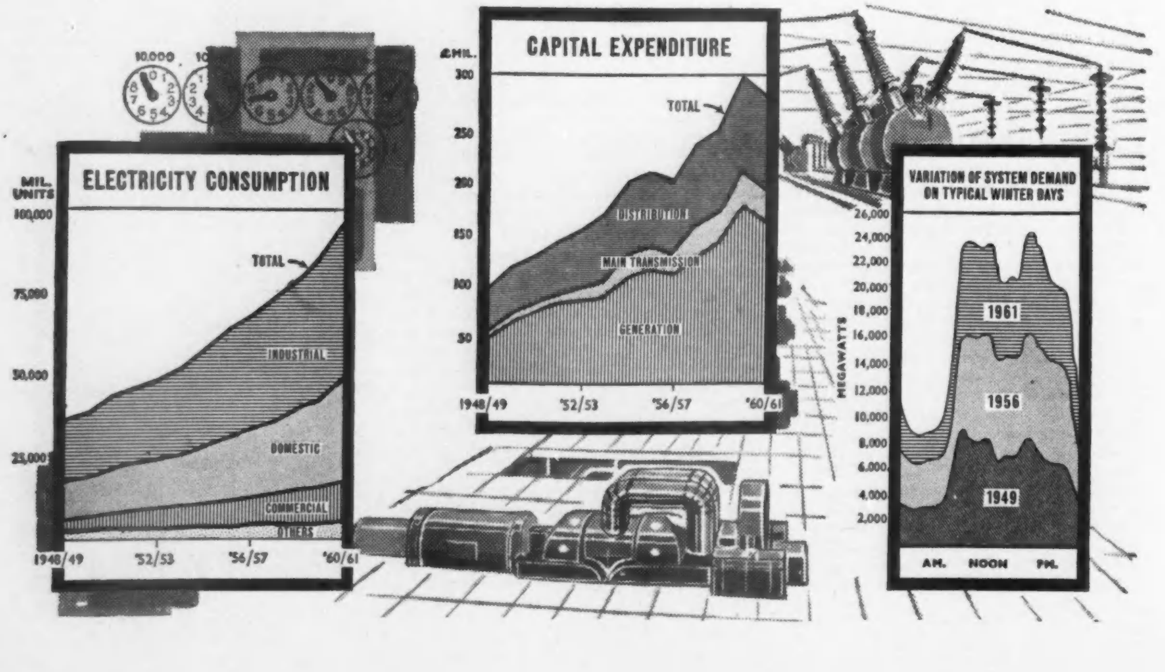
	1958–59 to 1960–61	
Capital Requirements	*Estimated in* 1958 m.	*Actual* m.
Generating Board	584	594
Twelve Area Boards	263	279
Working capital variation	3	(—) 29
	850	**844**
Financed from		
Depreciation provisions, surpluses and other internal resources	380 (44.8%)	385 (45.6%)
Net borrowing	**£470 m.**	**£459 m.**

More Power—More Plant

However, it was now very clear that the rise in electricity consumption could not be satisfied without acceleration of plant construction programmes. It was expected that the industry would have to face a maximum demand of over 33,000 MW in the winter of 1964–65—more than 12 per cent above the forecast made in 1958—and the most recent estimates suggested that subsequently, in the two years to 1966–67, it would rise by a further 5,000 MW.

In order to meet the necessary programme of power stations (conventional and nuclear), transmission lines and distribution systems, the estimates made in 1958 would have to be increased by some £200 million to cover the period to the end of 1964–65, and the continued rise in maximum demand would call for an outlay in excess of £400 million a year on fixed assets in the succeeding two years.

Sir Robertson pointed out that to reach the degree of self-financing involved, increasing surpluses were needed year by year, these surpluses, together with provisions for depreciation, being



The Annual Report of the Electricity Council was presented in London on Sept. 26th by the Chairman, Sir Robertson King, K.B.E.

Sir Robertson said that the financial year ended 31st March, 1961, had at least two features of some significance. The electricity supply industry had as usual shown a surplus after payment of all interest charges; and the increase in sales of electricity was the highest for ten years.

SIR ROBERTSON KING, K.B.E.

the main source of finance from internal resources. For this reason, and to cover increased costs of over £20 million per annum from wage and salary increases and a rise in coal prices, the Boards had been obliged to announce increases in most of their tariffs. Even so, these new tariffs had not taken into account cost increases of approximately £10 million per annum, arising from changes in the tax on fuel oil in the Finance Act, 1961.

Planned Surpluses

If cost increases, as they occurred, were not balanced by new revenues or even greater economies, more money had to be borrowed. The self-financing programme depended on achieving planned surpluses.

The term "surplus" did not imply something over and above the needs of the industry. It was a contribution from revenue to capital development.

The additional capital requirement of £200 million above the forecasts to 1964–65 and the heavy programme foreseen for subsequent years called for a full financial review, which was taking place in the setting of the Government's White Paper on the Financial and Economic Obligations of the Nationalised Industries. As a result financial objectives for the Boards would be determined for a period of five years, subject to review annually, within a framework settled with the Minister of Power. For the industry as a whole this would call for increased annual surpluses during the period. These higher surpluses would be essential if the industry were to achieve a financial performance in accordance with the requirements of the Government's White Paper and if it were to find the capital resources it needed, while keeping its borrowings within manageable limits.

Increased Prices not Automatic

The Chairman explained that the electricity supply industry did not think in terms of automatic increases in prices to cover increases in costs. There was ample evidence of this. Over the last ten years or so, power station fuels had risen 60 per cent in price; the cost of mechanical and electrical engineering materials had risen by 60 per cent and 40 per cent respectively; building and civil engineering costs had increased by more than 35 per cent and the interest rate on borrowed capital had nearly doubled. Against these increases, the industry had brought to bear considerable advances in technology, in the use of manpower and management techniques. As a result, the average price per unit of electricity sold to consumers as a whole in 1960–61 was kept down to 1.480d. as against 1.188d. ten years ago, an increase of no more than 25 per cent. It could be demonstrated that in relation to the overall level of retail prices electricity was actually 16 per cent cheaper. The Council considered it part of their duty to make known at every level in the industry how large a proportion of the nation's capital was going into electricity supply and the importance of ensuring that the most economic ways of deploying it were found.

Most Effective Use of Capital

The capacity of the supply industry was more fully used than most capital assets in British industry. Power station plant installed during the last ten years or so had worked on a year-round average of 100 hours per week. In addition there were special projects designed to ease the problem of meeting the daily peak loads. For example, the 300 MW pumped storage scheme at Blaenau Ffestiniog would enable electricity to be generated at peak hours by means of water previously pumped up to a high level reservoir by the most economical stations in off-peak hours. And again, the cross-Channel link with Electricité de France would be coming into commission soon. Because of the differences in the incidence of peak demand in the two countries, 160 MW of load could be transferred in either direction, with savings to both parties.

These were on the production side. So far as the customer was concerned the Area Boards were active in promoting those uses of electricity, such as refrigeration and water heating, which helped to create a balanced load. Even more important, they encouraged the wider use of storage heating and new industrial techniques with loads occurring in off-peak periods, or which permitted load reduction at peak times. Following the introduction of special terms for supplies made available during specified off-peak periods there had been a spectacular increase in the number of off-peak units sold.

Constant Search for Consumer Benefits

Sir Robertson King, who retires from the chairmanship of the Electricity Council on 31st December next, said that he could talk at length about other major achievements of the industry. Such features as: the completion of a rural electrification programme by which supply had been brought to 85 per cent of all farms in England and Wales; the continuing improvement in the thermal efficiency of power stations; and the increasing output of the industry as related to the number of employees. He could also refer to some of the major problems facing the industry. In particular, the difficulty of achieving a reasonable balance between the development of an economical supply system and the effect such development has on the beauty of the countryside and other amenities. The industry was facing up to these and other problems and the striking growth of the research programmes, now running at over £2½ million a year on revenue account, testified to the constant search for new, improved and cheaper ways to serve the electricity consumer.

TRADING RESULTS

£ million

		1960–61		*1959–60*
Gross income from all trading activities		**665**		*615*
Operating and other costs (excluding depreciation)		**465**		*425*
		200		*190*
Depreciation	104	–	*93*	—
Interest and financial charges, etc.	80	**184**	*70*	*163*
Net surplus—used to finance capital requirements		**16**		*27*

FINANCIAL POSITION AT YEAR END

£ million

	1960–61	*1959–60*
Fixed assets at cost	**3,209**	*2,929*
less depreciation and other capital provisions	**1,104**	*1,004*
	2,105	*1,925*
Current assets less current liabilities	**14**	*22*
Net assets	**2,119**	*1,947*
Financed as follows:		
External borrowings	**1,949**	*1,793*
Reserves (other than depreciation)	**170**	*154*
	2,119	*1,947*

THE ELECTRICITY COUNCIL

MEETINGS TO NOTE

THURSDAY, 5 OCT.

I.E.E. Presidential address, G. S. C. Lucas. Savoy Pl, W.C.2. 5.30 p.m.

I.E.S. (Glasgow). "The New I.E.S. Code," R. Croft. Institution of Engineers and Shipbuilders, 39 Elmbank Cres, Glasgow C.2. 6.30 p.m.

A.S.E.E. (Brighton, Hove and District). "The Police." The Cricketers' Hotel, Black Lion St, Brighton 1. 7.30 p.m.

Chelmsford Engineering Society. Presidential address, A. E. Gregg. Social Hall, Crompton Parkinson. 7.30 p.m.

B.E.A.M.A. Golden Jubilee Export Conference at Connaught Rooms and on 6 Oct.

FRIDAY, 6 OCT.

I.E.E. (Medical Electronics Group). Discussion: "What is pH and its Measurements?" Savoy Pl, W.C.2. 6 p.m.

I.E.E. (N. Staffs). Chairman's address, T. E. Calverley. English Electric Co. Ltd., Stafford. 7 p.m.

Junior Institution of Engineers. "Lighting Effects of the Palace in Kuwait," R. W. Shaw. Pepys Hse, Rochester Row, S.W.1. 7 p.m.

British Institution of Radio Engineers (S. Midlands Section). "Transistor Portables," R. A. Lampitt. Winter Gdns, Malvern. 7 p.m.

Society of Instrument Technology (Fawley). "Instrumentation in the Paper Industry," H. Wigman. Room 4a, Admin. Bldg, Esso Petroleum Co. Ltd. 5.45 p.m.

A.S.E.E. (Liverpool and District). "Applications and Failures of Ball and Roller Bearings," R. W. Jones. Industrial Development Centre, M.A.N.W.E.B., Paradise St. 7.30 p.m.

I.E.E. (N.E. Graduates and Students). Chairman's address: "The Impulse Strength of Transformer Windings," A. C. Hall. Grey Hall, King's College, Newcastle. 6.30 p.m.

MONDAY, 9 OCT.

Society of Instrument Technology (Manchester). "Instrumentation as an Aid to Fuel Efficiency," R. Clare. Literary and Philosophical Society, 36 George St. 6.45 p.m.

I.E.S. (Liverpool). Chairman's address, N. Blackman. Industrial Development Centre, Paradise St, Liverpool. 6 p.m

I.E.S. (Sheffield). Chairman's address, B. Ruston. Grand Hotel, Sheffield. 6.30 p.m.

I.E.E. (E. Anglian). Chairman's address: "Telephones and the Future," E. Hoare. Electric Hse, Ipswich. 6.30 p.m.

I.E.E. (N.E.). Chairman's address, P. Richardson. Neville Hall, Westgate Rd, Newcastle upon Tyne. 6.15 p.m.

I.E.E. (S. Midlands). Annual general meeting. "Television Camera Tubes," B. S. Pover. B.B.C. Engineering Dept., Wood Norton. 7 p.m.

I.E.E. (Western). Chairman's address, T. Gill. S. Wales Institute of Engineers, Cardiff. 6 p.m.

I.E.E. (Scottish Electronics and Measurement Group). Chairman's address, W. H. P. Leslie. Royal College of Science and Technology, Glasgow. 6 p.m.

I.E.E. (London Graduates and Students). Chairman's address, C. F. Price. Unit Cinema, 3 (Tels.) Trng. Bn., R.E.M.E., Arborfield. 7 p.m.

A.S.E.E. (Halifax Branch). "Solderless Connections," A. S. Ferguson. "Griffin" Hotel, George St, Halifax. 7.45 p.m.

A.S.E.E. (Central London Branch). "Electrical Supplies—London Underground System," D. F. Hudson. White Hall Hotel, Bloomsbury Sq, W.C.1. 7.15 p.m.

A.S.E.E. (North West London Branch). "Diesel-electric Locomotives," A. V. Stewart. Century Hotel, Wembley. 8.15 p.m.

TUESDAY, 10 OCT.

I.E.E (Measurement and Control). Chairman's address: "Trends in Computer Engineering," W. S. Elliott. Savoy Pl, W.C.2. 5.30 p.m.

I.E.E. (N. Midlands). "Power from the Atom by Fission and Fusion," K. W. Huddart. H.Q. Mess, School of Signals, Catterick Camp. 6.15 p.m.

I.E.E. (N.W. Utilisation Group). Chairman's address: "Project Planning," D. Marshall. Engineers' Club, Albert Sq, Manchester 2. 6.15 p.m.

I.E.E. (Southern Electronics and Control Group). Chairman's address, E. Wolfendale. University, Southampton. 6 p.m.

I.E.E. (Scottish Electronics and Measurement Group). Chairman's address, W. H. P. Leslie. Carlton Hotel, Edinburgh. 7 p.m.

I.E.E. (N. Ireland). Chairman's address: "Planning in Electric Power Supply Industry," W. Szwander. Lecture Theatre LG25, David Keir Bldg, Queen's University, Stranmillis Rd, Belfast 9. 6.30 p.m.

I.H.V.E. (S.W.). "Methods of Measurement," J. M. Cooling. R.W.A. School of Architecture, Bristol. 6.30 p.m.

Ministry of Works. "Heating Buildings," J. Clifford Byles. Cleveland Scientific and Technical Institution, Corpen Rd, Middlesbrough. 7.15 p.m.

Institution of Plant Engineers. "The Organisation of Preventive Maintenance," D. C. Muirhead. 25 Charlotte Sq, Edinburgh. 7.30 p.m.

I.E.S. Presidential address: "The Society's Contribution to Lighting Technology," W. T. Souter. Royal Institution, Albemarle St, W.1. 6 p.m.

I.E.S. (Stoke-onTrent Gp). "Stage Lighting," B. Legge. North Stafford Hotel, Stoke-on-Trent. 6.30 p.m.

A.S.E.E. (Aldershot and Districts Branch). "Modern Cable Jointing." Station Hotel, Basingstoke. 8 p.m.

A.S.E.E. (Chester and District Branch). "Industrial Application of Photo-electric Cells," A. C. Stewart. The Blossoms Hotel, Chester. 7.45 p.m.

A.S.E.E, (Glasgow Branch). "Electrical Distribution," Kenilworth Hotel, 5 Queen St, Glasgow, C.2. 8 p.m.

A.S.E.E. (Gloucester and District Centre). "Flameproofness and Intrinsic Safety," W. Bevan Whitney. Royal Hotel, Station Rd, Gloucester. 8 p.m.

A.S.E.E. (Leicester Branch). "Safety of an Electrical Installation," F. E. Noakes. Westcotes Constitutional Club, 124 Wilberforce Rd, Leicester. 7.30 p.m.

A.S.E.E. (York Branch). "Modern Development in Mechanical Power Transmission," Royal Station Hotel, York. 7.30 p.m.

Society of Relay Engineers. "Television Distribution by Coaxial Cable," G. J. Hunt and C. F. Whitbread. 21 Bloomsbury St, W.C.1. 2.15 p.m.

Conference: "Electricity in the Foundry" at Wulfrun Hall, Wolverhampton, until 11 Oct.

WEDNESDAY, 11 OCT.

I.E.E. (N.E.). "Progress in Oil-filled Cables and Their Accessories," A. N. Arman, F. J. Miranda and G. R. Bishop. "The Influence of Ageing on the Characteristics of Oil-filled Cable Dielectric," P. Gazzana-Priaroggia, G. L. Palandri and U. A. Pelagatti. Carlisle Technical College. 7 p.m.

I.E.E. (Rugby). Chairman's address, K. J. R. Wilkinson. Rugby College of Engineering Technology. 6.30 p.m.

I.E.E. (N. Lancs). Chairman's address, F. Clegg. N.W.E.B. Demonstration Theatre, Friargate, Preston. 7.30 p.m.

I.E.E. (Oxford). "The Developing Engineer," J. E. L. Robinson. Demonstration Room, S.E.B., 37 George St. 7 p.m.

Institution of Mechanical Engineers. "The Design and Manufacture of Cigarette Making Machines," D. Molins. 1 Birdcage Walk, S.W.1. 6 p.m.

Society of Instrument Technology (Control Section). Process Control in Paper Mills," H. B. Whitehouse and M. I. MacLaurin. Manson Hse, 26 Portland Pl, W.1. 6.30 p.m.

British Institution of Radio Engineers (S.W. Section). "General Introduction to Inertial Navigation," R. Collinson; and "Components and Techniques Employed in Inertial Navigation Systems," E. Bristowe. School of Management Studies, Unity St, Bristol. 7 p.m.

A.S.E.E. (Birmingham Branch). "Industrial Application of Photo-electric Cells," G. A. G. Ive. The Engineering and Building Centre, Stephenson Pl, Birmingham 2. 7.30 p.m.

A.S.E.E. (Bristol and West of England Branch). "Protective Equipment for Industrial Plant," Dr W. L. Stern. The Turk's Head Hotel, Exeter. 8 p.m.

A.S.E.E. (East Anglia (Thetford) Centre). "Recent Developments in Fluorescent Lighting," G. V. McNeill. The Red Lion Hotel, Thetford, Norfolk. 7.30 p.m.

Tenth Coal Science Lecture. "Position of Coal in Electric Power Generation," L. Rotherham. Conway Hall, Red Lion Sq, W.C.1. 5.30 p.m.

I.E.S. (Newcastle). Chairman's address, R. A. Hall. Lunchtime meeting in Prince of Wales Room, County Hotel.

THURSDAY, 12 OCT.

I.E.E. (E. Midlands). "The I.E.E. Wiring Regulations," Forbes Jackson. E.M.E.B. Showrooms, Spalding. 7.30 p.m.

I.E.E. (N. Scotland). Centre Chairman's address, E. G. Cullwick. Electrical Engineering Dept., Queen's College, Dundee. 6 p.m.

I.E.E. (W. Wales). Chairman's address, W. E. Lewis. Electricity Board Showrooms, The Kingsway, Swansea. 6 p.m.

I.E.E. (Utilisation). Chairman's address: "Research in the Field of Electricity Utilisation," H. G. Taylor. Savoy Pl, W.C.2. 5.30 p.m.

Radar and Electronics Association. "Space Communications—Systems and Equipment," L. F. Mathews. Royal Society of Arts, John Adam St, W.C.2. 7 p.m.

Ministry of Works. "Colour and Light in Buildings," A. E. Hurst. Municipal Technical College, Blackburn. 7.15 p.m.

Institution of Plant Engineers (N. East). "Management Problems in a Maintenance Department," T. Gormley. Roadway Hse, Oxford St, Newcastle upon Tyne 1. 7 p.m.

Society of Instrument Technology (E. Midlands). "The Commonsense Approach to Instrument Manufacture," C. E. T. Cridland. The Derby and District College of Technology, Kedleston Rd, Derby. 7.30 p.m.

Society of Instrument Technology (Tees-Side). "Automation in the Post Office," N. Burley. Cleveland Scientific and Technical Institution, Middlesbrough. 7.30 p.m.

I.E.S. (Cardiff). Chairman's address, G. J. Everett. Grand Hotel, Cardiff.

I.E.S. (Manchester Centre). "The New I.E.S. Code," J. G. Holmes. Demonstration Theatre, NWEB, Town Hall Extension, Manchester 2. 6 p.m.

I.E.S. (Nottingham Centre). Chairman's address, Electricity Centre, Carrington St, Nottingham. 6 p.m.

A.S.E.E. (Bradford and District Branch). "A New Approach to Traction Battery Charging," D. Kirkby. The Midland Hotel, Bradford. 7.30 p.m.

A.S.E.E. (Nottingham Branch). "Control Centres for Modern Industry," R. Ritchie. People's College of Further Education, Castle Rd, Nottingham. 7.30 p.m.

FRIDAY, 13 OCT.

I.E.E. (N. Scotland). Centre Chairman's address, E. G. Cullwick. Robert Gordon's Technical College, Aberdeen. 6 p.m.

Junior Institution of Engineers. "The Technician, Education and Industry," J. Heywood. Pepys Hse, Rochester Row, S.W.1. 7 p.m.

Society of Instrument Technology (Midlands). "Differential Producers for Flow Measurement," H. E. Dall. Lecture Theatre, Byng Kendrick Suite, Gosta Green College of Technology, Aston St, Birmingham. 7 p.m.

A.S.E.E. (Reading and Districts Branch). Annual Dinner and Dance. Calcot Hotel, Reading.

A.S.E.E. (Stoke and Crewe Branch). Annual Dinner. Grand Hotel, Hanley.

E.P.E.A. (Meter Engineers' Technical Group). "The Meaning of Engineering," W. T. O'Dea. Caxton Hall, S.W.1. 6.30 p.m.

SATURDAY, 14 OCT.

A.S.E.E. (Liverpool and District Branch). Annual Dinner and Dance. Mecca Restaurant, Exchange St East, Liverpool.

MONDAY, 16 OCT.

I.E.E. (Mersey and N. Wales). "The 12 MeV Van de Graaff Accelerator to be Installed at Liverpool University," B. S. Halliday. Chadwick Laboratory, Liverpool University. 6.30 p.m.

I.E.E. (N.E. Measurement and Electronics Group). Chairman's address, A. J. Colgan. Rutherford College of Technology, Northumberland Rd, Newcastle upon Tyne. 6.15 p.m.

I.E.E. (Western Supply Group). Chairman's address, F. G. Copland. S. Wales Institute of Engineers, Park Pl, Cardiff. 6 p.m.

I.E.E. (London Graduates and Students). Chairman's address, C. F. Price. Savoy Pl, W.C.2. 6.45 p.m.

Birmingham Electric Club. "Underwater Nuclear-powered Freighters," E. A. Woodward and P. B. Mason. Grand Hotel. 5.30 p.m.

TUESDAY, 17 OCT.

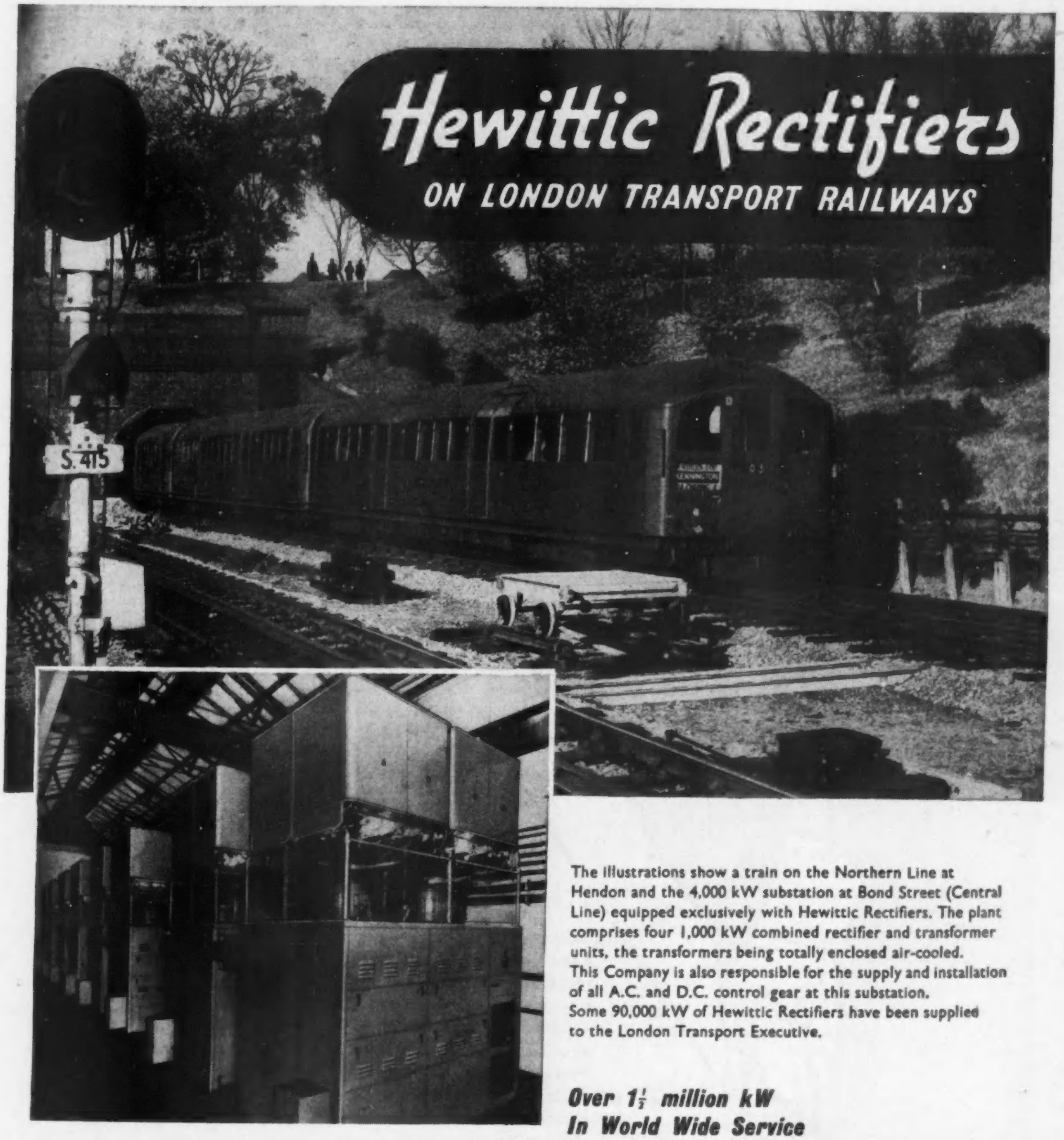
I.E.E. (Education Circle). Discussion: "The Place of Digital Computers in the Teaching of Electricity Engineers." Savoy Pl, W.C.2. 6 p.m.

I.E.E. (E. Midlands). "Safety in the Utilisation of Electricity," S. J. Emerson. Nottingham University. 6.30 p.m

I.E.E. (N. Midlands Utilisation Group). Chairman's address, F. Clarke. Leeds and County Conservative Club, South Parade, Leeds 1. 6.30 p.m.

I.E.E. (N.W. Measurement and Control Group). Chairman's address: "Some Protection and Automatic Features of the British Grid," E. C. Smith. Engineers' Club, Albert Sq, Manchester. 6.15 p.m.

Fourteenth Engineering Display at Royal Horticultural Society's New Hall, S.W.1, until 19 Oct.



The illustrations show a train on the Northern Line at Hendon and the 4,000 kW substation at Bond Street (Central Line) equipped exclusively with Hewittic Rectifiers. The plant comprises four 1,000 kW combined rectifier and transformer units, the transformers being totally enclosed air-cooled.
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CLASSIFIED ADVERTISEMENTS

PUBLIC NOTICES

E.A.W. Certificate for Demonstrators and Saleswomen

The E.A.W. EXAMINATION IN ELECTRICAL HOUSECRAFT (Theoretical) will be held on Thursday, 14 Dec., 1961, from 2 p.m. to 5 p.m., at various centres in Great Britain.

Full particulars and entrance forms may be obtained from:

Examinations Department,
The Electrical Association for Women,
25 Foubert's Pl,
London W.1.

IMPORTANT—The final date of entry for the Examination is 26 Oct., 1961.
(C 268)

APPOINTMENTS VACANT

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

ASSISTANT SECTION ENGINEER

REQUIRED in the Chester District of the Board's No. 3 Sub-Area. Salary within range £1,115/£1,245 per annum (N.J.B. J/9).

Applicants should have had experience in the construction and operation of overhead and underground distribution systems up to 33 kV, including indoor and outdoor substation equipment, and be in possession of appropriate technical qualifications.

Appointment subject to medical examination. Pension Scheme.

Applications, on forms obtainable from the Manager, No. 3 Sub-Area, Electricity Hse, Newgate St, Chester, must be forwarded not later than 23 Oct., 1961. (C 242)

CENTRAL ELECTRICITY GENERATING BOARD

South Thames Division

KINGSTON POWER STATION

ASSISTANT ENGINEER (TECHNICAL)

Vacancy No. 225A/61.

A VACANCY exists for a qualified engineer who is interested in carrying out investigations into power station performance with particular emphasis on the handling and combustion of low grade fuel. He will be directly responsible to the Operation Superintendent.

Salary: N.J.B. Class G, Grade 11, £875/£990 per annum, including London Allowance.

Applications, giving age, details of qualifications, experience, etc., should be sent to the Station Superintendent, Kingston Power Station, Downhall Rd, Kingston upon Thames, Surrey, to arrive by 16 Oct. (C 245)

THE NORTH WESTERN ELECTRICITY BOARD

SECOND ASSISTANT DISTRICT ENGINEERS

CENTRAL DISTRICT, MANCHESTER

THE duties will include the supervision of the erection and maintenance of substation switchgear, laying and jointing of cables, and switching operations on the H.V. and L.V. systems within the District as required. Applicants should have had a wide general experience on the distribution side of electricity supply, and be prepared to undertake standby duties. Corporate membership of the Institution of Electrical Engineers will be an advantage.

Salary Scale: £1,275/£1,410 p.a. Grade J.7. N.J.B. Conditions.

Applications on forms to be obtained from the Manager (Staff Vacancy), No. 1 Sub-Area, The North Western Electricity Board, Town Hall, Manchester 2, P.O. Box 493, and returned to him by 16 Oct., 1961.
(C 244)

BRISTOL COLLEGE OF SCIENCE AND TECHNOLOGY, ASHLEY DOWN, BRISTOL 7

Department of Electrical Engineering

THE Governors invite applications for post of

LECTURER

to teach heavy current subjects in courses leading to Diploma in Technology, I.E.E. Part III, and Higher National Diploma.

Candidates must hold appropriate academic and/or professional qualifications, and should have had teaching, industrial and/or research experience.

Salary within range £1,370/£1,550 p.a. (This may be adjusted on introduction of new scales for Colleges of Advanced Technology.)

Application forms and details from the Registrar. When applying, please quote reference CST 61/35. (C 229)

KAMPALA MUNICIPAL COUNCIL

Uganda, East Africa

WORKS SUPERVISOR (ELECTRICAL)

REQUIRED in scale £1,143/£1,671, plus 6% gratuity on completion of contract of 21/27 months; 4 months' paid leave and air passages for officer and family after two years; Provident Fund (adds 7½% to salary); housing at nominal rent; medical and dental benefits; car loan and allowances; good climate and conditions.

Applicants must have served a five-year apprenticeship with a recognised electrical undertaking or company and hold the Ordinary National Certificate (Electrical) or equivalent qualification. Works training and experience in maintenance and repair of S.G.E. and/or A.T.E. vehicular actuated traffic signals essential.

The duties are principally on the installation and maintenance of the vehicular actuated traffic signals; also on the installation, maintenance and repair of the normal electrical systems and plant of a local authority.

Apply, giving age and two referees, to the Town Clerk, P.O. Box 210,Kampala, Uganda, by 21 Oct., 1961. Canvassing disqualifies.
(C 182)

THE EAST MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited from suitably qualified and experienced persons for the following appointments. Applicants should state age, qualifications, experience, etc., and quote the appropriate vacancy number.

Lincolnshire Sub-Area

DISTRICT COMMERCIAL ENGINEER

SPALDING DISTRICT

Vacancy No. 116/61.

Salary: N.J.B. Class E, Grade 3, £1,275/£1,410 per annum with progression to Grade 2.

The District is operated as a double-headed organisation and the successful candidate will be responsible for all the district commercial activities.

The duties will include responsibility for the negotiations for the supply of electricity to consumers, street lighting matters, advice on tariffs, electrical installations and appliances, sales activities, control of service centres and consumer service, the preparation of specifications and estimates for electrical installations and the supervision of contracting work.

Candidates should hold the Higher National Certificate in Electrical Engineering or an equivalent qualification.

The successful candidate will be required to live in or near to Spalding and the ability to drive a car is essential.

Applications should be forwarded to the Manager, Lincolnshire Sub-Area, North Hse, Grantham, Lincs, by 20 Oct., 1961.

Northamptonshire Sub-Area

THIRD ASSISTANT ENGINEER

(SUBSTATIONS)

Vacancy No. 118/61.

Salary: N.J.B. Class K, Grades 9-11, £1,040/£1,325 per annum, depending on the experience and qualifications of the successful candidate.

The duties will include assisting in the organisation and supervision of construction and equipment of substations up to 33 kV.

Applications should be forwarded to the Manager, Northamptonshire Sub-Area, 25 Bridge St, Northampton, by 20 Oct., 1961.

Mansfield and North Nottinghamshire Sub-Area

GENERAL ASSISTANT ENGINEER

(DRAUGHTSMAN)

Vacancy No. 119/61.

Salary: N.J.B. Class L, Grade 15, £825/£940 per annum.

The duties will include the preparation of engineering drawings, substation design, and layout plans.

Applications should be forwarded to the Manager, Mansfield and North Nottinghamshire Sub-Area, Lime Tree Pl, Mansfield, Notts, by 20 Oct., 1961. (C 251)

NORTH THAMES GAS BOARD

ELECTRICAL DRAUGHTSMAN

REQUIRED at Westminster. Applicants should possess O.N.C. (Electrical) and should have experience in the preparation of drawings and specifications for electrical work, preferably of the low current type. Experience also required in the servicing of telemetering equipment in the field and in the use of standard testing apparatus. A knowledge of switchgear protection and the ability to carry out routine tests would be an advantage.

Starting salary within the range £850/£1,135 per annum, according to experience.

Applications should be sent to the Staff Controller, North Thames Gas Board, 30 Kensington Church St, W.8, quoting ref.: ET/1008. (C 248)

Advertisements should be sent to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London, W.C.2, before 10 a.m. on TUESDAY of the week of issue. Official Displayed Advertisements are charged at 46s. per inch, and all other classified advertisements at 3s. 6d. per line. Situations Wanted four insertions at twice the single insertion rate. Fee for Box Number and postage on replies 2s.

SOUTH OF SCOTLAND ELECTRICITY BOARD

Edinburgh and Borders Area

THIRD ASSISTANT ENGINEER (PLANNING AND DEVELOPMENT)

AREA HEADQUARTERS, DEWAR PLACE
EDINBURGH

SALARY: N.J.B. Schedule A, Class L, Grade 10. Salary Scale No. 10, £1,190/£1,325 p.a.

Applications, on the standard form obtainable from the undersigned or any other Area Manager, should be submitted not later than 21 Oct., 1961.

Applicants for this superannuable appointment should have a sound engineering training and experience in the design and layout of densely loaded distribution networks in city areas and rural systems at pressures up to and including 33 kV; the application of modern protective equipment and of the calculation and preparation of load flow diagrams and fault levels. Applicants must also possess as a minimum qualification a Higher National Certificate in Electrical Engineering or its equivalent.

Conditions of service will be in accordance with the National Joint Board Agreement for the Electricity Supply Industry. The successful candidate will require to reside within a reasonable distance of Area Headquarters.

C. H. A. COLLYNS,
Manager.

52 Melville St,
Edinburgh 3.

(C 223)

CENTRAL ELECTRICITY GENERATING BOARD

West Midlands Division

THIRD ASSISTANT ENGINEER

REQUIRED in the Stourport District of the Electrical Department. N.J.B. service conditions, superannuable appointment, salary in accordance with Grade L8, £1,165/£1,500 per annum.

Applicants should have had experience in the operation and maintenance of high voltage transmission lines, substations, transformers and heavy electrical equipment. A knowledge of protective gear, metering, or telecommunications equipment would be an advantage and applicants should preferably possess the Higher National Certificate in electrical engineering or equivalent qualification.

Apply, quoting Vacancy Number 257/61 MD to Mr S. S. Tyler, Stourport District Engineer, Stourport District Office, Worcester Rd, Stourport-on-Severn, Worcs, by 16 Oct., 1961. (C 234)

CITY AND COUNTY OF NEWCASTLE UPON TYNE TRANSPORT AND ELECTRICITY UNDERTAKING

APPLICATIONS are invited for the appointment of

ASSISTANT ELECTRICAL ENGINEER

in the Electricity Department.

Candidates should have experience in the electricity supply industry, preferably in the operation and maintenance of high tension and low tension distribution systems, including mercury arc rectifier substations and rotary converter substations.

The salary is APT. II (£815/£960 per annum) and the appointment is subject to the provisions of the Local Government Superannuation Acts and to the passing of a medical examination.

Applications stating age, experience, position held, etc., together with copies of three recent testimonials and endorsed "Assistant Electrical Engineer," should be addressed to the undersigned and received not later than Monday, 16 Oct., 1961.

FRANK S. TAYLOR,
General Manager.

Newcastle Corporation Transport and
Electricity Undertaking,
Manors,
Newcastle upon Tyne 1.
27 Sept., 1961.

(C 228)

RHODESIA CONGO BORDER POWER CORPORATION LIMITED

KITWE, NORTHERN RHODESIA

TECHNICAL ENGINEERS

APPLICATIONS are invited from qualified Electrical Engineers (Degree or Corporate Membership) for the position of Technical Engineer on the Corporation's Engineering Staff at Kitwe, Northern Rhodesia, the operational centre of its 220 kV and 66 kV networks.

Applicants should be preferably in the age group 28-38, having had at least five years' experience in the electricity supply industry or in the manufacture of apparatus related to the supply industry.

The duties will include:

1. Calculations related to system load studies, protective gear settings, maximum short circuit evaluations, including the use of a d.c. analyser board. Experience in tariff computations would be an advantage.

2. Supervision of the Protection Department, which is responsible for the installation, commissioning and maintenance of modern forms of protective gear and including carrier frequency electronic telemetering, remote control and communicating apparatus.

The design of the equipment is at present the responsibility of the Corporation's Consulting Engineers, with whom the Technical Engineer would be required to maintain close liaison.

The commencing basic salary will be in the region of £1,800/£2,000 (Rhodesian currency) per annum, dependent on experience. The successful applicant will participate in the Corporation's Bonus Scheme. The rate of bonus is related to the prosperity of the Copper Mining Industry. The present rate is 36½% of basic salary. Housing (including basic heavy furniture) will be provided at a sub-economic rental.

Medical Specialist Fund, Pension and Life Assurance Schemes are provided. In the case of the latter, the employee contributes a minimum of 5% of basic salary and the Corporation a further 5%, plus ½% for each completed year of service.

Paid leave will be at the rate of 51 days per annum and may be accumulated to a maximum of three years' entitlement.

The Corporation is responsible for all electricity supplies to the Copper Mining Industry in Northern Rhodesia. The system load is at present 260 MW, 1,800 million kWh per year.

All applications, giving full details of experience, marital status, etc., should reach The Secretary, Rhodesia Congo Border Power Corporation Ltd., P.O. Box 819, Kitwe, Northern Rhodesia, not later than 15 Oct., 1961. (C 130)

THE BRITISH ELECTRICAL & ALLIED MANUFACTURERS' ASSOCIATION

APPLICATIONS from men aged not more than 30 are invited for the post of

ASSISTANT

in a Department at Ascot, largely concerned with heavy rotating plant. The main requirements are a good education, an ability to write clearly, intelligence and an agreeable manner.

The successful candidate would be expected, after an initial familiarisation with the background of the Department's work, to attend Committee meetings, record proceedings and work on the documents produced.

A technical qualification is not essential, but a background knowledge of the heavy side of the Electrical Industry could be an advantage. Sufficient interest in this field is essential to enable the holder of the post to handle technical terms with understanding.

A salary will be paid commensurate with qualifications and experience.

The post is permanent and pensionable.

Applications should be addressed to The Establishments Officer, BEAMA, 36 Kingsway, London W.C.2. (C 232)

CENTRAL ELECTRICITY GENERATING BOARD

South Thames Division

DUNGENESS NUCLEAR POWER STATION

SHIFT CHARGE ENGINEERS

Staff Vacancy Notice No. 241/61.

APPLICATIONS are invited for the appointment of five Shift Charge Engineers for Dungeness Nuclear Power Station.

Applicants should have had extensive experience of the commissioning and operation of modern power station plant, together with experience of administration and the control of labour.

Experience of the operation of nuclear power station plant is not essential as adequate training can be given to successful applicants before taking up their appointments.

Applicants should be qualified for admission to Corporate or Graduate Membership of a Senior Engineering Institution.

The salaries for these posts will be in accordance with the National Joint Board Agreement, Schedule A, Class N, Grade 6, £1,795/£1,950 per annum, plus 10% Shift Allowance.

Applications stating age, qualifications, experience, etc., should be addressed to: Personnel Officer, Central Electricity Generating Board, South Thames Division, Lower Ham Rd, Kingston upon Thames, Surrey, to arrive by 25 Oct., 1961. (C 221)

THE NORTH WESTERN ELECTRICITY BOARD

THIRD ASSISTANT DISTRICT ENGINEER (TESTING)

WEST LAKELAND DISTRICT
WORKINGTON

APPLICANTS should be capable of inspecting, testing and commissioning all kinds of switchgear, transformers, etc., and particularly must have an intimate knowledge of protective systems.

Possession of the H.N.C. in Electrical Engineering will be an advantage.

Salary Scale: £965/£1,090 p.a. Grade G9. N.J.B. conditions.

SENIOR DEMONSTRATORS

BARROW-IN-FURNESS, WORKINGTON
AND CARLISLE

Duties will be actively to promote the sales of electrical energy and equipment. Experience must include extensive negotiations with Public Bodies including Education Authorities, School Meals Services, Domestic Organisations and Teachers.

Experience of successful public speaking will be an advantage.

Salary Scale: £700 x £25—£775 p.a. Grade 2. N.J.C. Conditions.

Applications on forms to be obtained from the Manager, No. 6 Sub-Area, The North Western Electricity Board, Castle Green, Kendal, and returned to him by 16 Oct., 1961. (C 231)

CENTRAL ELECTRICITY GENERATING BOARD

South Thames Division

LITTLEBROOK POWER STATION

ASSISTANT ENGINEER (EFFICIENCY)

Vacancy No. 59a/61.

CANDIDATES should possess technical qualifications to at least H.N.C. standard and practical experience in generating station work would be an advantage. The successful applicant will be required to assist the Station Efficiency Engineer in investigations into the thermal performance of the plant, and will be required to work independently and to take the initiative in solving problems which arise.

Salary: N.J.B. L11, £1,165/£1,295 per annum, including London Allowance.

Applications giving age, details of experience, qualifications, etc., should be sent to the Station Superintendent, Littlebrook Power Station, nr. Dartford, Kent, to arrive by 11 Oct. (C 199)

CENTRAL ELECTRICITY GENERATING BOARD

North Eastern Region

STEAM TESTING DEPARTMENT

ASSISTANT INSTRUMENT ENGINEER

APPLICATIONS are invited from suitably qualified technicians for the position of Assistant to the Instrument Engineer in Dunston Power Station, Dunston upon Tyne.

Candidates shall have served a recognised apprenticeship and have some relevant experience of manufacture, commissioning or maintenance of instruments or control equipment for boiler, turbine or chemical process plant.

Applicants should possess an Ordinary National Certificate in Mechanical or Electrical Engineering as a minimum qualification.

The salary for the appointment (which is superannuable) will be in accordance with the National Joint Board Agreement, Grade 12, Class K (£965/£1,090 per annum), and will commence at a point commensurate with qualifications and experience.

Forms of application may be obtained from the Assistant Regional Secretary (Personnel), Central Electricity Generating Board, North Eastern Region, 1 Whitehall Rd, Leeds 1, to whom they should be returned to arrive not later than 13 Oct., 1961. (C 222)

CENTRAL ELECTRICITY GENERATING BOARD

South Eastern Region

North Thames Division

APPLICATIONS are invited for the following appointment:

GENERAL ASSISTANT ENGINEER

BRADWELL (NUCLEAR) GENERATING STATION (ESSEX)

(S.V. No. 1513)

Salary: N.J.B. Class M, within the range of Grades 20-17, Scales 1-4, £625/£870 per annum, plus £90 per annum Shift Allowance when required to work on shift.

The commencing salary will depend upon the duties and responsibilities.

The duties associated with this post will include assisting in the operation of nuclear reactors and conventional turbo-alternating plant, plant testing and maintenance work.

Previous experience in a generating station and technical training to the standard of Ordinary or Higher National Certificate or the equivalent will be an advantage.

Applications, quoting Reference S.V. No. 1513, stating age, qualifications, experience and present position, should be sent to the Personnel Officer, Central Electricity Generating Board, South Eastern Region, North Thames Division, West Farm Pl, Chalk La, Cockfosters, Barnet, Herts, to arrive not later than 14 Oct., 1961.

F. W. SKELCHER,
Assistant Regional Director.
(C 243)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

FOURTH ASSISTANT ENGINEER

(PLANNING)

REQUIRED at No. 1 Sub-Area Headquarters, Liverpool. Salary within range £1,040/£1,165 per annum (N.J.B. Class M, Grade 13).

Applicants should have had sound training in all aspects of the distribution of electricity, and have a knowledge of the technical and economic principles underlying the design of distribution systems. The possession of suitable technical qualifications is desirable.

Appointment subject to medical examination. Pension Scheme.

Special application forms, obtainable from the Manager, No. 1 Sub-Area, 24 Hatton Gdn, Liverpool 3, should be returned not later than 23 Oct., 1961.

Previous applicants need not re-apply. (C 241)

COUNTY OF LANARK

CHIEF TECHNICAL ASSISTANT

(LIGHTING)

APPLICATIONS are invited for the post of Chief Technical Assistant in the Lighting Section of the County Surveyor's Department at Hamilton on the salary scale £850/£1,150 with placing according to qualification and experience. Applicants should be Corporate Members of the Association of Public Lighting Engineers or the Institution of Electrical Engineers and should have extensive knowledge of the design, erection and maintenance of public lighting installations.

Superannuation scheme in operation and five-day week. Medical examination.

Applications stating age, qualifications and experience, with the names and addresses of three referees, to be lodged with undersigned not later than 11 Oct., 1961.

IAN V. PATERSON,
County Clerk.

P.O. Box No. 1,
Glasgow. (C 219)

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts:

Headquarters:

THIRD ASSISTANT ENGINEER

(COMMUNICATIONS)

(CHIEF ENGINEER'S DEPARTMENT)

Duties will cover work associated with the design, development, operation and maintenance of wired and radio telephone communications and control systems, together with similar work on other associated electronic and light current equipment. Technical qualifications desirable. Salary within the range £1,285/£1,610 per annum according to qualifications and experience (N.J.B. Schedule B, Grade 6 BX). Apply, by letter, within 14 days, stating age, experience, present position and salary, to The Secretary, Midlands Electricity Board, P.O. Box No. 8, Mucklow Hill, Halesowen, nr. Birmingham.

Birmingham Area

ENGINEERING DRAUGHTSMAN

(GENERAL ASSISTANT ENGINEER)

(AREA OFFFICE)

Applicants should have experience in the preparation of drawings in connection with the layout of high voltage and medium voltage switchgear, cables, etc., and preparation of mains records for an extensive high voltage and medium voltage overhead and underground distribution system. Salary within the ranges £765/£870, £825/£940, £890/£1,015, £965/£1,090, £1,040/£1,165 per annum (N.J.B. Grade N.18 to 14), according to qualifications and experience.

DRAUGHTSMAN (AREA OFFICE)

Duties will include the preparation of plans and sketches and compilation of cartographic mains records. Salary: £780/£880 per annum (N.J.C. Grade 3).

Apply, by letter, within seven days, stating age, experience, qualifications, present position and salary, to Emil Braathen, Area Manager, Midlands Electricity Board, 14 Dale End, Birmingham 4.

North Staffs. Area

FOURTH ASSISTANT ENGINEER

The appointment is for shift duties in the Stoke-on-Trent Common Service Control Centre, The Parkway, Hanley. The successful applicant will be required to assist the Distribution Shift Control Engineer in the operation of the Area Transmission and Distribution System. Applicants should have a knowledge of system operation and loading. Experience in the operation of Supervisory Controlled Substations would be an advantage. Technical qualifications desirable. Salary: £965/£1,090 per annum, plus 10% shift enhancement (N.J.B. Grade L.13). Apply, by letter, within ten days, stating age, experience, present position and salary, to Mr C. C. Pimble, Area Manager, Midlands Electricity Board, 234 Victoria Rd, Fenton, Stoke-on-Trent.

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Worcestershire Area

FIRST ASSISTANT DISTRICT ENGINEER

(WORCESTER AND MALVERN)

Applicants should have had experience in all branches of District work including the planning of H.V. and L.V. distribution systems, and the operation and maintenance of high and low voltage cables, switchgear and transformers. Technical qualifications desirable. Salary: £1,190/£1,325 per annum (N.J.B. Grade F.5). Apply, by letter, within 14 days, stating age, qualifications, experience, present position and salary, to Mr R. Mallet, Area Manager, Midlands Electricity Board, P.O. Box No. 52, Blackpole Rd, Worcester.

THIRD ASSISTANT DISTRICT COMMERCIAL ENGINEER

(EVESHAM)

Applicants should have had experience in contracting work, including the preparation of estimates, and in the sale and installation of electrical apparatus. Technical qualifications desirable. Salary: £825/£940 per annum (N.J.B. Grade F.10). Apply, by letter, within ten days, stating age, experience, present position and salary, to District Manager, Midlands Electricity Board, 64 High St, Evesham.

F. W. CATER,
Secretary.
(C 237)

CENTRAL ELECTRICITY GENERATING BOARD

South Eastern Region

APPLICATIONS are invited for the following superannuable post. Conditions of service in accordance with N.J.B. Agreement, Schedule A. Salary includes London Allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. an advantage.

ASSISTANT ENGINEER (HANDLING)

BRUNSWICK WHARF POWER STATION

Vacancy No. 61/597.

Experience of coal and ash handling plant maintenance and operation. Control of unloading ships, arranging for coal and oil deliveries and the removal of ash and dust will be part of the responsibilities. Salary: Class K, Grade 8, £1,325/£1,460 per annum.

Previous applicants will be considered.

Applications, quoting vacancy number may be made to (or on form from) Personnel Department, Central Electricity Generating Board, P.O. Box No. 136, London W.1. to be received not later than 10 Oct., 1961. (C 230)

THE SOUTH WALES ELECTRICITY BOARD

GENERAL ASSISTANT ENGINEER

(ARCHITECTURAL ASSISTANT)

APPLICATIONS are invited for the position of General Assistant Engineer (Architectural Assistant) in the Chief Engineer's Department at Head Office, St. Mellons.

Salary: N.J.B. Class J, Grade 12, Scale 6, £815/£1,015 per annum.

The successful applicant will receive a commencing salary of at least £890 per annum.

Applicants should preferably be of Intermediate R.I.B.A. standard.

Applications stating age, present position, present salary, qualifications and experience, should be addressed to the undersigned at St. Mellons, Cardiff, to arrive not later than 21 Oct., 1961. Please quote reference 119/61/ET, endorsing envelope "General Assistant Engineer (Architectural Assistant)."

R. G. WILLIAMS,
Secretary.
(C 218)

CENTRAL ELECTRICITY GENERATING BOARD

West Midlands Division

STATION ASSISTANT SHIFT CONTROL ENGINEER

REQUIRED at Stourport "A" and "B" Power Stations. N.J.B. service conditions, superannuable appointment, salary within Schedule A of the Agreement, Grade K.12, £965/£1,090 per annum, plus 10% for shift duties.

A sound technical training and practical experience in the control of steam generating plant and main switchgear are required. Appropriate technical qualification an advantage.

Apply, quoting vacancy number 259/61 MD, on form AE6, available from the Station Superintendent, Stourport Power Station, Severn Side, Stourport-on-Severn, Worcs, by 16 Oct., 1961. (C 255)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments in the Board's No. 1 Sub-Area:

ASSISTANT SECTION ENGINEER

in the Liverpool South District. Salary within range £1,115/£1,245 per annum (N.J.B. J/9).

ASSISTANT SECTION ENGINEER

in the Southport District. Salary within range £890/£1,015 per annum (N.J.B. F/9).

Applicants should have had technical training and had operational experience of h.v. and l.v. networks including substations. Technical qualifications desirable.

Appointments subject to medical examination. Pension scheme.

Application forms may be obtained from the Manager, No. 1 Sub-Area, 24 Hatton Gdn, Liverpool 3, and should be returned not later than 23 Oct., 1961. (C 258)

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Region

East Midlands Division

ASSISTANT SHIFT CHARGE ENGINEER

LEICESTER POWER STATION

Vacancy No. 216/61.

APPLICATIONS are invited for the position of Assistant Shift Charge Engineer, at the Leicester Power Station, Raw Dykes Rd, Leicester.

Applicants should have received a sound technical training and have experience in a modern Power Station. Preference will be given to candidates who possess a Higher National Certificate or its equivalent.

Salary will be in accordance with Class G, Grade 9 (£965/£1,090 per annum) of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications: 13 Oct., 1961.

FIRST ASSISTANT STATION CHEMIST

DERBY POWER STATION

Vacancy No. 217/61.

Applications are invited for the position of First Assistant Station Chemist at Derby Power Station, Sowter Rd, Derby.

Previous experience in a Power Station laboratory is essential and candidates should preferably be Associates of the Royal Institute of Chemistry or hold an equivalent qualification. Candidates must be familiar with the methods of sampling and analysis of coal, oil and water and with the interpretation and application of the analytical results. Experience with problems arising from high pressure, high temperature operation and of the solution of such problems is desirable.

Salary will be in accordance with Class F, Grade 9 (£890/£1,015 per annum) of the National Joint Board Agreement.

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Closing date for receipt of applications: 13 Oct., 1961.

GENERAL ASSISTANT ENGINEER (CHEMIST)

SPONDON POWER STATION

Vacancy No. 222/61.

Applications are invited for the position of General Assistant Engineer (Chemist) at Spondon Power Station, near Derby.

Candidates must have had a sound technical training and previous laboratory experience and should preferably hold the Higher National Certificate in Chemistry, but consideration will be given to candidates studying for that qualification.

Salary will be in accordance with Class J, Grade 14 (£765/£870 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications: 20 Oct., 1961.

GENERAL ASSISTANT ENGINEER (EFFICIENCY AND PLANNING)

WILLINGTON "A" AND "B" POWER STATIONS

Vacancy No. 223/61.

Applications are invited for the position of General Assistant Engineer in the Efficiency and Planning Department at Willington "A" and "B" Power Stations, P.O. Box No. 27, Derby. Candidates should have the minimum qualification of an Ordinary National Certificate in Mechanical or Electrical Engineering and should have an understanding of the problems involved in modern power station operation.

The salary will be within Class M, Grade 16 (£825/£940 per annum), of the National Joint Board Agreement.

Closing date for receipt of applications: 20 Oct., 1961.

These appointments are pensionable within the terms and conditions of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT, which may be obtained from the Station Superintendent concerned and should be returned to him by the date stated.

O. S. WOODS,
Assistant Regional Director.
(C 249)

SOUTH EASTERN ELECTRICITY BOARD

ASSISTANT DISTRICT ENGINEER

CROYDON AND PURLEY DISTRICT

SALARY: £1,165/£1,295 per annum, including London Allowance under N.J.B. Agreement, Class J, Grade 9. Superannuable. Applicants should be suitably qualified and have operational experience of maintenance and construction on distribution systems up to 11 kV. Candidates should also have experience of planning work.

Applications, quoting ET and naming two referees, on forms from District Manager, Seeboard, Electric Hse, Wellesley Rd, Croydon, by 18 Oct., 1961.

ASSISTANT DISTRICT ENGINEER

SUTTON DISTRICT

Salary: £1,115/£1,245 per annum, plus London Allowance under N.J.B. Class G, Grade 7. This district (77,000 consumers) covers a dense urban area on the outskirts of London. Applicants of good general education should have had technical training to Higher National Certificate standard, with practical experience of general distribution work, and be capable of carrying out planning, construction and maintenance work. Consideration will be given to a private car allowance and, in appropriate circumstances, to assistance with housing.

Applications, quoting ET, on forms from District Manager, Seeboard, 52 High St, Sutton, by 18 Oct., 1961.

GEORGE WRAY,
Secretary.
(C 260)

TRINIDAD AND TOBAGO ELECTRICITY COMMISSION

West Indian Engineers who are interested in careers with the Trinidad and Tobago Electricity Commission are invited to write to the Secretary and Personnel Manager, P.O. Box 121, Port-of-Spain, Trinidad, West Indies. There are good opportunities for young West Indian Nationals with degrees in Electrical or Mechanical Engineering or who are Graduate Members of the Institution of Electrical Engineers. Commencing Salary £1,050 per annum. Experience not necessary but candidates **must** be qualified.

(C 124)

'ENGLISH ELECTRIC'

TECHNICAL AUTHORS

The Aircraft Equipment Division of the Company at Bradford requires the services of several engineering authors to prepare maintenance and user handbooks for their products. These cover complete aircraft control systems, electric, electro-mechanical and hydraulic power systems and generators (a.c. and d.c.), actuators, encapsulated motors for G.W. use, etc. This equipment incorporates many new and unusual devices, such as brushless alternators, 400 cycle generation, transistorised control circuits, etc.

Applicants should preferably possess a minimum qualification to H.N.C. level and must have a good knowledge of circuitry. Previous knowledge of technical writing would be an advantage, but the main requirement is an ability to express technicalities in everyday language. These vacancies would be of interest to people recently engaged on handbook preparation in the Services.

Please reply, giving full details of experience and qualifications to the **TECHNICAL PERSONNEL OFFICER, c/o DEPT. G.P.S., ENGLISH ELECTRIC HOUSE, STRAND, LONDON, W.C.2.** *quoting reference number E.T.292B.*

(C 233)

SOUTH WALES SWITCHGEAR LIMITED

TECHNICAL SALES ENGINEERS

S.W.S. have vacancies for outside sales engineers to operate in the North West Area.

One is required to deal with electricity board work and another to call on industrial concerns.

Preference will be given to applicants who possess at least the H.N.C. in Electrical Engineering, and have served a recognised apprenticeship course. Some experience in switchgear manufacture is essential.

Applications giving full particulars of training, technical qualifications, age and salary expected should be addressed to:

The Home Sales Manager,
South Wales Switchgear Ltd.,
Rex Bldgs, Wilmslow, Cheshire,

and mark the envelope "Confidential."

(C 262)

A SALES ENGINEER

having experience of temperature control application is required by

THE
RHEOSTATIC
COMPANY LIMITED
SLOUGH BUCKS

The successful applicant will be responsible for dealing with customer's technical inquiries by telephone and letter. He will, therefore, require experience in handling technical sales correspondence. An essential facet of his duties will be the production of wiring diagrams in rough form and advising customers of the correct applications of the temperature control for heating systems and this will call for a sound technical level of the order of H.N.C. Electrical.

This is a permanent and pensionable post arising from the promotion of the present incumbent, and applications should be made to the Personnel Manager.

(C 264)

TASMANIA—AUSTRALIA

ENGINEERS

Electrical and Mechanical

Salary Range £A1,540-£A2,482 per Annum for Hydro-Electric Projects in Tasmania with the Hydro-Electric Commission

University graduates in electrical or mechanical engineering with appropriate experience in electrical engineering design or hydraulic and/or mechanical engineering design associated with major Hydro-Electric Power schemes for service up to 220,000 volts, are invited to contact or submit applications, in duplicate, supported by copies of testimonials or names of referees to the Agent General for Tasmania, 457 Strand, London W.C.2. Closing date will be four weeks after publication of this advertisement.

(C 172)

Aberdare Cables Ltd., manufacturers of Paper and Plastic Insulated Cables, require an Electrical Engineer to take control of their Development Department. This will be a senior position responsible directly to the Chief Engineer.

Applicants must possess an engineering degree, have had some cable experience and preferably some knowledge of experimental techniques. Age 28-32.

Apply by letter, in strict confidence, giving complete details of technical qualifications, experience and salary to:

The Secretary,
Aberdare Cables Ltd.,
Aberdare, Glamorgan.

(C 263)

OVERHEAD TRANSMISSION LINE ENGINEERS

Agents, Sub-Agents and Engineers required for 275 kV and 132 kV Steel Tower Line Contracts in Scotland. State age and give full details of experience in confidence to Box No. 994, Keith and Co., 11 Castle St, Edinburgh. (C 269)

RTB

RICHARD THOMAS & BALDWINS LIMITED

SPENCER WORKS

Vacancies exist for

ASSISTANT ELECTRICAL ENGINEERS

at the integrated iron and steel plant now under construction at Llanwern, near Newport, Mon.

Successful candidates will be required to assist in the design, layout and commissioning of installations.

The range of specialisation is not rigid but preference will be given to applicants with some experience of steel works or other heavy industrial plant. This is a first-class opportunity for young men holding a Higher National Certificate in electrical engineering, and who are keen to widen their experience in the field of heavy electrical engineering, as there are a large number of new and interesting techniques incorporated in this plant.

Application forms, which should be returned by 18 October, can be obtained from:

The Manager, Staff & Labour Relations Dept.,
RICHARD THOMAS & BALDWINS LIMITED,
Spencer Works, Llanwern, Nr. Newport, Mon.

Please quote Ref. No. 202/1a in your letter of application.

(C 238)

ATTRACTIVE VACANCY
for
EXPERIENCED ELECTRICAL MACHINE DESIGNER
in
AUSTRALIA

Capable of designing and developing both a.c. and d.c. machines of up to 500 h.p.

The post is Assistant Design Engineer to the Chief Electrical Engineer of an Australian company, situated Melbourne, which designs and manufactures a large range of Rotating Electrical Equipment.

Good technical qualifications and design experience essential.

Commencing salary £2,500 per annum (Australian), depending on ability and experience.

Excellent prospects to advance to Chief Electrical Engineer of the Company in the future.

Applications in writing giving details of training and experience, positions held, etc., to:

The General Manager,
The Electric Construction Co. Ltd.,
Bushbury Engineering Works,
Wolverhampton.

(C 265)

SOUTH OF SCOTLAND ELECTRICITY BOARD

APPLICATIONS are invited for the superannuable position of

MECHANICAL MAINTENANCE ENGINEER
HUNTERSTON NUCLEAR GENERATING STATION
NEAR LARGS, AYRSHIRE

The successful candidate will be directly responsible to the Maintenance Superintendent for all maintenance of mechanical plant at the Station. Candidates should have served a recognised apprenticeship and have had experience in organising and carrying out maintenance programmes. Minimum technical qualification required will be a Higher National Certificate. Specialised nuclear training will be arranged for the successful applicant.

Salary: N.J.B. Class M, Grade 6, £1,650/£1,830 per annum.

Applications, quoting Ref. No. G28/61, should be submitted on the standard form to the Secretary, South of Scotland Electricity Board, Inverlair Ave, Glasgow S.4, not later than 20 Oct., 1961. (C 250)

Eastern Electricity

CHILTERNS SUB-AREA

FOURTH ASSISTANT ENGINEER
LUTON DISTRICT
207/61.R.

CANDIDATES should have had a sound training in electrical engineering and experience in the construction, operation and maintenance of underground and overhead distribution systems, including substations.

Salary: N.J.B. Class J, Grade 11 (£965/£1,090).

Apply by letter to the Manager, Luton District, Eastern Electricity Board, 487 Dunstable Rd, Luton, by 20 Oct., 1961.

ESSEX SUB-AREA

GENERAL ASSISTANT ENGINEER
(DRAUGHTSMAN)
SUB-AREA HEADQUARTERS
206/61.R.

Duties include preparation of drawings of building and civil engineering work for offices, showrooms, 11 and 33 kV substations, etc., and applicants should be capable of carrying out site surveys.

Possession of the Ordinary National Certificate (Building) or equivalent qualifications will be an advantage.

Salary: N.J.B. Class M, Grade 16 (£825/£940) plus £50 London Allowance.

Apply by letter to C. C. Brazier, A.M.I.E.E., Engineer, Essex Sub-Area, Eastern Electricity Board, Millfield, Bentley, nr. Brentwood, Essex, by 20 Oct., 1961. (C 254)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

ASSISTANT CONSUMERS' ENGINEER

REQUIRED at Wrexham in the Board's No. 4 Sub-Area.

Salary within range £890/£1,015 per annum (N.J.B. H.11, Scale 6).

Applicants should have had engineering training, and some experience of rural development and public lighting and the general development of domestic and commercial load, including the organisation of promotional activities, exhibitions, etc. Experience in estimating and preparing specifications for contracting work would be an advantage.

Appointment subject to medical examination. Pension Scheme.

Application forms obtainable from the Manager, No. 4 Sub-Area, Electricity Hse, Rhostyllen, nr. Wrexham.

Closing date: 23 Oct., 1961. (C 256)

SOUTHERN ELECTRICITY BOARD

METER ENGINEER

SUB-AREA Engineering Department of No. 1 (Southall) Sub-Area, located at Waterloo Rd, Uxbridge. Salary: N.J.B. Class M, Grade 5 (£1,795/£1,950 per annum, plus £60 London Allowance). N.J.B. Conditions of Service.

The successful candidate will be responsible to the Sub-Area Engineer for the administration and control of the Sub-Area Meter Testing Station and to supervise all meter work throughout the Sub-Area. Candidates should be Corporate Members of the I.E.E. or possess equivalent qualifications. They must have a sound knowledge of all matters relating to meter engineering, including statutory requirements, and must be fully experienced in the operation of modern Class A stations dealing with all types of a.c. and d.c. meters, demand indicators, instruments, time switches, instrument transformers and protective relays.

Applications on forms obtainable from the Sub-Area Secretary, 2-6 Windmill La, Southall, Middx, and returned to him, quoting Z.1414, not later than 16 Oct., 1961.

ASSISTANT ENGINEER (PLANNING)

Oxford District of No. 2 (Newbury) Sub-Area. Salary: N.J.B. Class K, Grade 10 (£1,115/£1,245 per annum). N.J.B. Conditions of Service.

The duties of the post will be to assist the Planning Engineer in the preparation of schemes and estimates for extensions of and reinforcement to overhead and underground H.V. and L.V. networks. Applicants should possess suitable technical qualifications.

Applications on forms obtainable from the Sub-Area Secretary, 7 Oxford Rd, Newbury, Berks, and returned to him, quoting Z.1415, not later than 16 Oct., 1961.

SHIFT ENGINEER

Melksham District of No. 2 (Newbury) Sub-Area, located at Hawthorn (Quarry) site, Corsham. Salary: N.J.B. Class G, Grade 12 (£765/£870 per annum, plus a shift allowance at present £90 per annum). N.J.B. Conditions of Service.

The duties of the post will be to supervise manual staff employed on the maintenance of H.V. and L.V. networks and plant, and to be responsible to the senior engineer for the operation and control of such networks and plant.

Applications on forms obtainable from the Sub-Area Secretary, 7 Oxford Rd, Newbury, Berks, and returned to him, quoting Z.1417, not later than 16 Oct., 1961.

SERVICE REPRESENTATIVE

Bournemouth District of No. 4 (Bournemouth) Sub-Area, located at the New Milton branch. Salary: N.J.C. Grade 2 (£700/£775 per annum). N.J.C. Conditions of Service.

Candidates should possess the ability to advise on supply matters, tariffs, apparatus and sales to consumers with domestic or small commercial or industrial installations.

Applications on forms obtainable from the Sub-Area Secretary, 1 Priory Rd, Bournemouth, and returned to him, quoting Z.1413, not later than 16 Oct., 1961.

DEMONSTRATOR

Portsmouth District of No. 3 (Portsmouth) Sub-Area. Salary: N.J.C. Grade 1 (£600/£700 per annum). N.J.C. Conditions of Service.

Applicants should be qualified to advise generally on the utilisation of electric domestic appliances, to give public demonstrations of apparatus and to assist in showroom duties. The possession of an E.A.W. Certificate or equivalent domestic science qualifications would be an advantage.

Applications on forms obtainable from the Sub-Area Secretary, Lower Drayton La, Cosham, Portsmouth, and returned to him, quoting Z.1357, not later than 16 Oct., 1961.

The successful candidates for the above appointments will be required to contribute to the Electricity Supply (Staff) Superannuation Scheme, if eligible. (C259)

YORKSHIRE ELECTRICITY BOARD

No. 3 (Sheffield) Sub-Area

SHEFFIELD DISTRICT
ASSISTANT ENGINEER (CONSUMERS)

THIS post is within the Commercial Department of a large and important district offering good opportunities for experience and advancement. A knowledge of tariffs and their appropriate application and experience in negotiating with consumers for new and additional supplies and general load development including in particular development of the space heating load would be an advantage. The successful applicant must be able to control engineering staff and workpeople.

Salary: N.J.B. Class L, Grade 11 (Scale 9), £1,115/£1,245 p.a.

ROTHERHAM AND MEXBOROUGH DISTRICT
ASSISTANT CONSUMERS' ENGINEER
(TWO POSTS)

Applicants should have had a sound practical training in the Electricity Supply Industry.

They should be conversant with I.E.E. Regulations and also with statutory regulations applicable to electricity supplies.

The should have had experience in negotiations with all types of consumers requiring electricity supplies, with tariff applications, load development and control of staff.

Salary: N.J.B. Class K, Grade 12 (Scale 7), £965/£1,090 p.a.

Applications, together with the names of two referees, should be sent to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Change Alley, Sheffield, not later than 20 Oct., 1961.

No. 1 (Bradford) Sub-Area

BRADFORD DISTRICT
ASSISTANT CONSUMERS' ENGINEER

Candidates should be capable of preparing specifications in respect of lighting, heating and power installations and of dealing with consumers' queries regarding the application of electricity for domestic, commercial and industrial purposes.

Salary: N.J.B. Class K, Grade 12 (Scale 7), £965/£1,090 p.a.

Applications, together with the names of two referees, should be sent to the Manager, No. 1 (Bradford) Sub-Area, Yorkshire Electricity Board, 45-53 Sunbridge Rd, Bradford 1, not later than 20 Oct., 1961. (C 252)

CENTRAL ELECTRICITY GENERATING BOARD

South Eastern Region

North Thames Division

APPLICATIONS are invited for the following appointment:

ASSISTANT ENGINEER (SITE)
WEST THURROCK GENERATING STATION
(GRAYS, ESSEX)

Salary: N.J.B., Class M, Grade 13, Scale 8, £1,090/£1,215 per annum, inclusive of London Weighting.

The duties of the applicant will include the supervision of gatekeepers and security arrangements, station cleaning staff, grounds, etc.

He will also be required to organise Civil Defence, Fire Fighting and First Aid services, to supervise station transport and building maintenance, to make arrangements for visitors and to assist in safety matters.

Applicants should be good organisers and some knowledge of building maintenance would be an advantage.

Applications, quoting reference number S.V. 1547, stating age, previous experience and present position, should be sent to the Personnel Officer, Central Electricity Generating Board, North Thames Division, West Farm Pl, Chalk La, Cockfosters, Barnet, Herts, to arrive not later than 14 Oct., 1961.

F. W. SKELCHER,
Assistant Regional Director.
(C 220)

CENTRAL ELECTRICITY GENERATING BOARD

Western Division

STATION SHIFT CONTROL ENGINEER

W/AV/92/61.

REQUIRED at Newton Abbot Power station.

Superannuation Scheme. Salary: N.J.B. Class F, Grade 10, Scale 5, £825/£940 p.a., plus £90 shift allowance.

Candidates should possess good technical qualifications and should have had training and experience in the control and operation of steam generating plant and main switchgear.

ASSISTANT SHIFT CHARGE ENGINEER

W/AV/93/61.

required at East Yelland Power Station.

Superannuation Scheme. Salary: N.J.B. Class J, Grade 8, Scale 10, £1,190/£1,325 p.a., plus 10% shift allowance.

Applicants should possess good technical qualifications and should have had training and experience in the Control and Operation of Modern Steam generating plant and main switchgear.

Applications on Form AE6/ACT obtainable from the Divisional Secretary, 26 Oakfield Rd, Bristol 8, should be completed and returned by 16 Oct., 1961. (C 253)

THE SOUTH WALES ELECTRICITY BOARD

ASSISTANT ENGINEER

APPLICATIONS are invited for the position of Assistant Engineer in the Mid-Wales and North Mon District (Abergavenny) of the Monmouthshire and Mid-Wales Area.

Preference will be given to Engineers possessing the Higher National Certificate in Electrical Engineering.

Salary: N.J.B. Class E, Grade 7, Scale 7 (£965/£1,090 per annum).

Applications stating age, present position, present salary, qualifications and experience, should be addressed to W. E. Richardson, M.I.E.E., Manager, Mon and Mid-Wales Area, Llywelyn Rd, Cwmbran, to arrive not later than 21 Oct., 1961.

Please quote reference 124/61/ET, endorsing envelope "Assistant Engineer."

R. G. WILLIAMS,
Secretary.
(C 272)

CENTRAL ELECTRICITY GENERATING BOARD

South Western Region

REGIONAL STATISTICAL ENGINEER

APPLICATIONS are invited for the post of Regional Statistical Engineer responsible to the Deputy Regional Director at the Regional Headquarters of the Board in Bristol.

The successful candidate will be required to provide statistical services to all departments at Regional Headquarters and in the three Divisions of the Region and will also be responsible for the development and production of monitoring records for management in the Region. He will be required to apply mathematical and statistical methods to practical problems and to liaise with other sections of the Board's organisation in the development and use of statistical methods and records.

A degree in statistics or mathematics with statistics or other suitable qualification together with appropriate experience is required.

The salary for the post will be in accordance with the scale £2,170/£2,380 per annum, but according to qualifications and present experience the successful candidate may be initially appointed on scale £1,965/£2,170 or £1,760/£1,965.

Applications should be addressed to the Regional Secretary, Central Electricity Generating Board, South Western Region, 1 Eaton Cres, Clifton, Bristol 8, so as to arrive not later than Monday, 23 Oct., 1961. (C 273)

CORPORATION OF LONDON

City Surveyor's Department

INVITE applications for permanent post of:

ELECTRICAL ENGINEERING ASSISTANT

Salary scale: £1,055/£1,310.

Candidates should be Graduated Members of the Institution of Electrical Engineers and have had experience in preparation of schemes for electrical lighting, heating and power installations in public buildings, electric lifts and small ventilating schemes, and the maintenance of existing services.

Local Act Superannuation.

Applications, stating age, previous appointments and experience, with names of two referees, to City Surveyor, Guildhall, E.C.2, within 14 days. (C 247)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

DEMONSTRATOR (FEMALE)

REQUIRED in the Board's No. 2 Sub-Area to be based at St. Helens. Salary within range £600/£700 per annum (N.J.C. Grade 1), according to experience and qualifications. Staff conditions of service, including Holiday, Sick Pay and Pension Schemes.

Applicants should possess the E.A.W. Demonstrator's Certificate or other qualification, and should preferably have had training and experience in the use and demonstration of electric cookers and other domestic electrical appliances.

The post is active and interesting, and involves wide contact with the public, particularly housewives, women's organisations and schools.

Appointment subject to medical examination.

Application forms obtainable from the Manager, No. 2 Sub-Area, Sandiway Hse, Northwich, Cheshire. Closing date: 20 Oct., 1961. (C 257)

AGENT wanted for West Country and South Wales by manufacturers of small rotating electrical machines. Considerable preparatory work already done in the area. Apply Box No. 8427, Electrical Times. (C 225)

ASSISTANT ELECTRICAL ENGINEER required by Consulting Civil Engineers for interesting and varied programme of electrical design including substations, distribution systems and installations in various types of buildings. Must be Grad I.E.E. or equivalent. Apply in writing, stating age, experience, qualifications and salary required to Sir William Halcrow and Ptnrs, Alliance Hse, Caxton St, London S.W.1. (C 187)

APPLICATIONS are invited by Kennedy and Donkin, 12 Caxton St. London S.W.1 (Ref. RFL), for an ASSISTANT in the Cable Department at their Weybridge Office. Applicants must be qualified electrical engineers with experience in design, manufacture and installation of cables for transmission and generation projects. (C 68)

CONTRACT ENGINEERS AND ELECTRICAL ENGINEER. Well-known firm of engineers specialising in industrial instruments and automatic boiler and process control equipment, now installed in large modern factory in Surrey, have a vacancy for an Engineer with good technical training and education to at least Ordinary National Certificate standard, preferably with experience in instrumentation and capable of conducting contract correspondence; preparation of electrical/electronic wiring diagrams would be an advantage for Electrical Engineer. Applications stating age and experience to C.C.E., Box No. 8433, Electrical Times. (C 267)

CABLE ENGINEER required for the Midlands area capable of supervising cable laying and jointing contracts. An excellent opportunity for a man wishing to take charge of an area and work with a considerable amount of freedom. Pension scheme and car provided. Reply stating age, salary and experience.—Box No. 8421, Electrical Times. (C 156)

ELECTRICAL ENGINEERING ASSISTANTS required with experience in any of the following:

(1) Planning of electrical installations and preparation of specifications for new schools and other large buildings.

(2) Preparation of schemes of repair and improvement of electrical installations in all classes of buildings.

(3) Preparation of schemes and specifications for all types of electric lifts.

(4) The operation of maintenance contracts and arranging for servicing works on electric lifts.

Applicants should be Corporate Members of the Institution of Electrical Engineers or hold some recognised technical qualification, e.g., National Certificate or Diploma of the A.S.E.E. Up to £1,500 according to qualifications, age and experience. Pension scheme. Staff restaurant. Forms from the Chief Engineer (GS/ET/2662/10), L.C.C., County Hall, S.E.1. (C 227)

EXPERIENCED CONTRACTS ENGINEERS required for progressive engineering works in the Midlands. Apply giving particulars of experience, age, salary expected, to Box 205, c/o Dawsons, 129 Cannon St, London E.C.4. (C 274)

ELECTRICAL SALES ENGINEER. A permanent appointment with established West Country agency to handle Switchgear, Control Gear and Cable sales.

Applicants must be trained engineers, but not necessarily qualified.

Starting salary commensurate with age, sales experience and knowledge of Western and South Wales territories.

Car and full expenses provided. Profit sharing scheme can be entered into after a probationary period.

Please write giving details of engineering training, sales experience and anticipated salary.—Box No. 8431, Electrical Times. (C 266)

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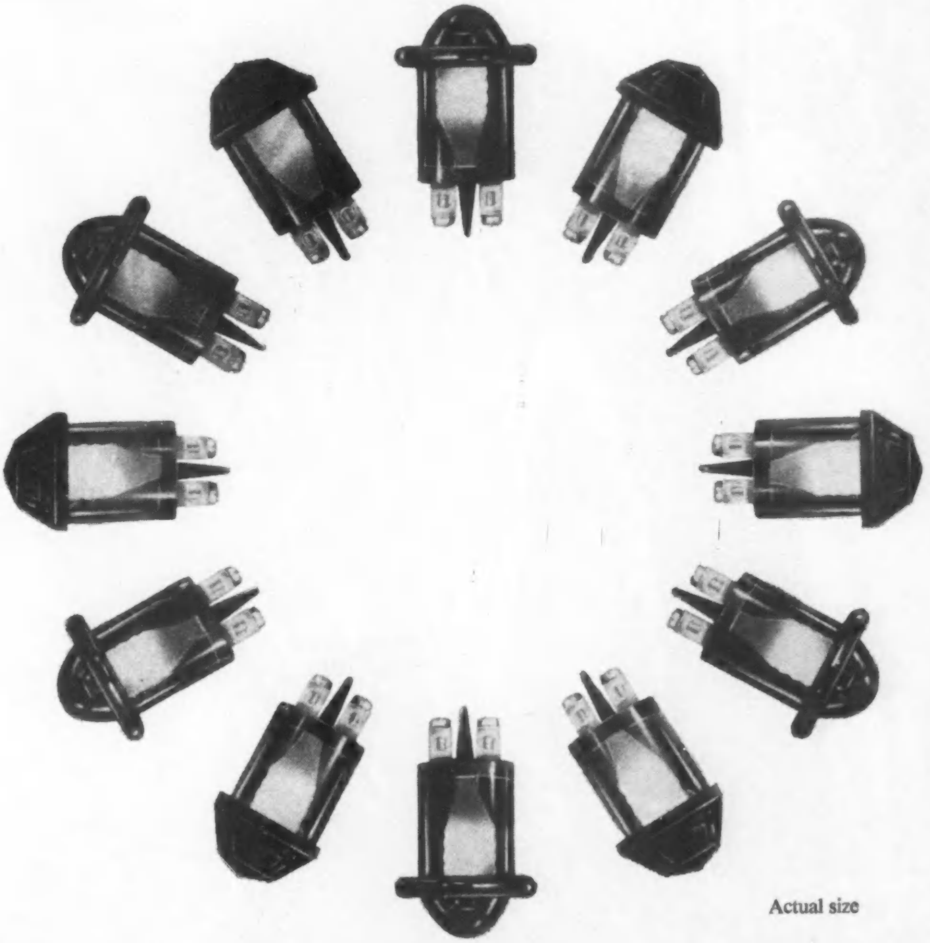

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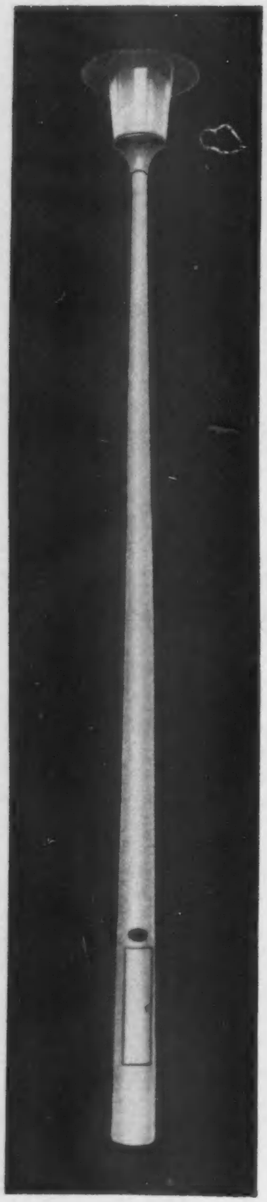

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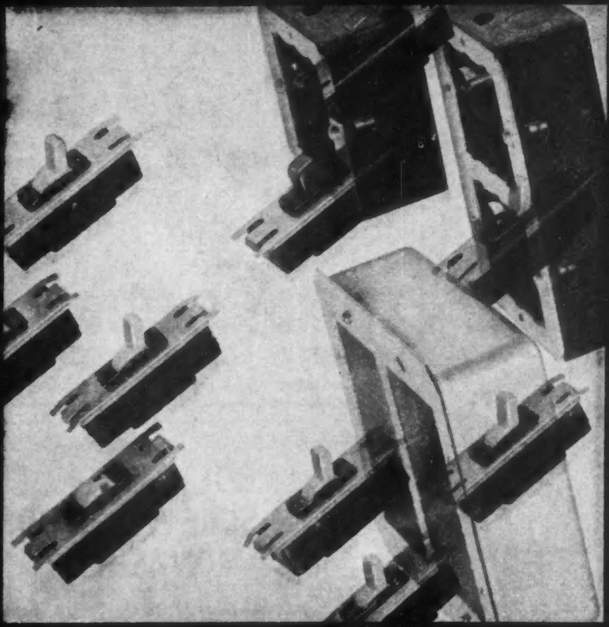

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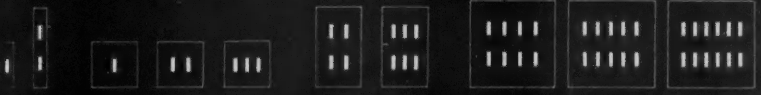

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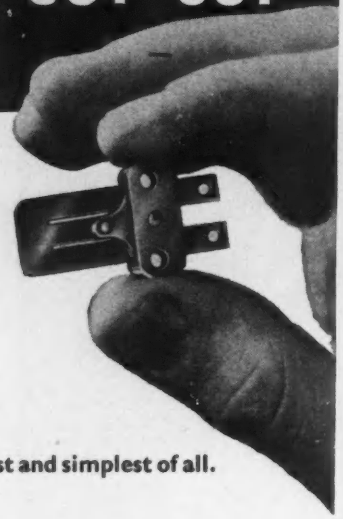

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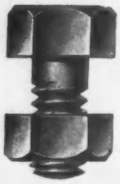

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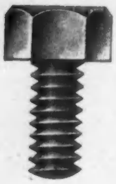

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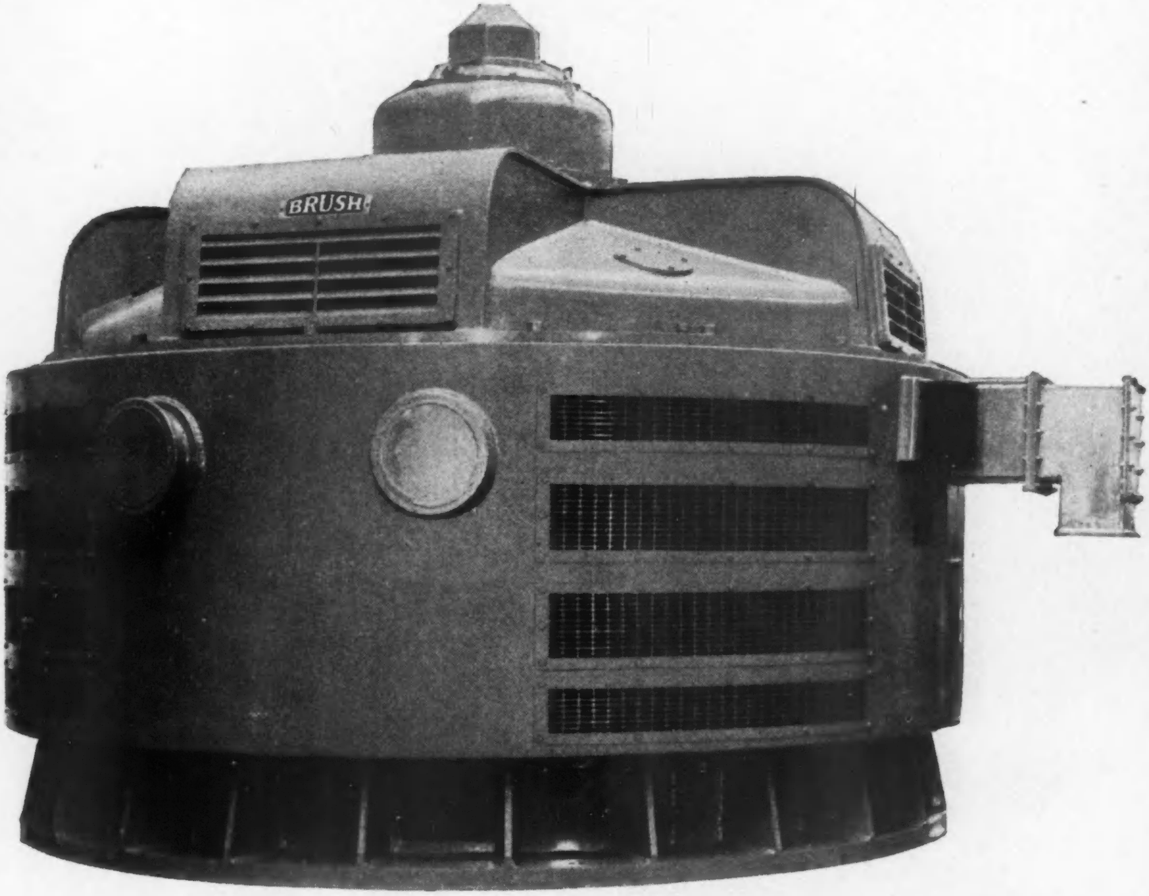

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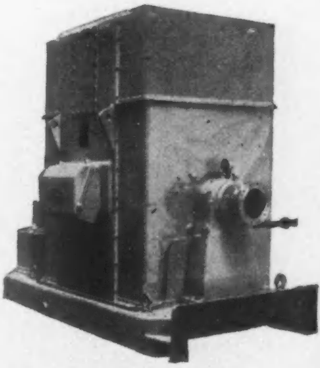

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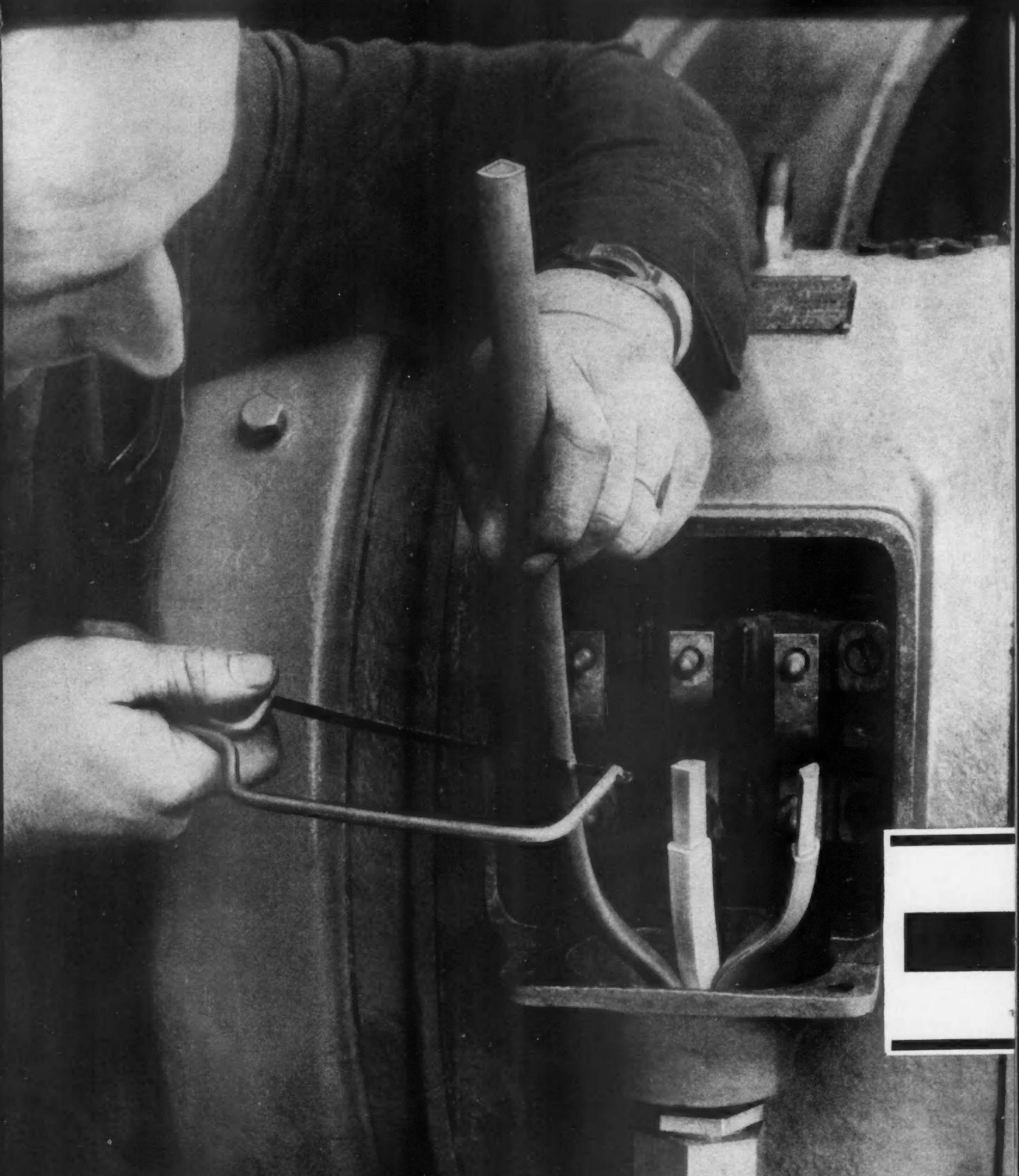

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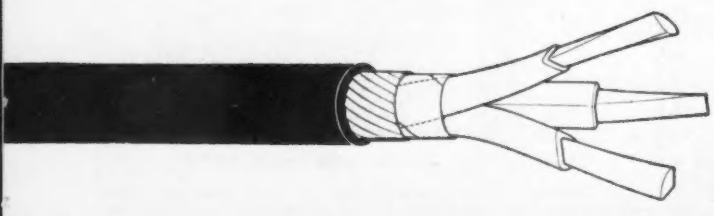

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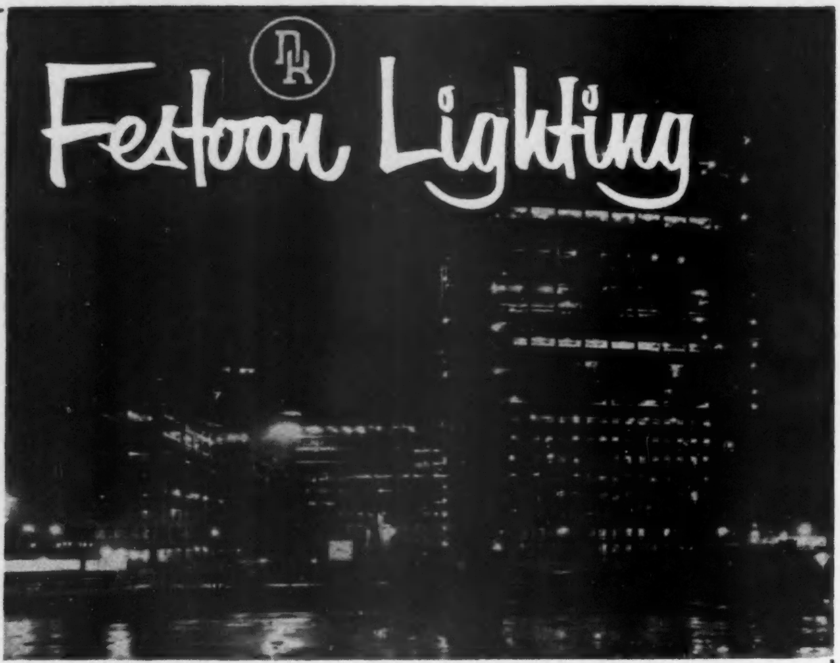

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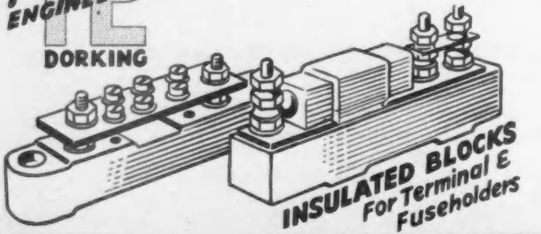

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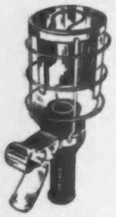
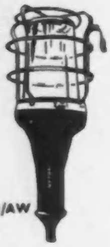
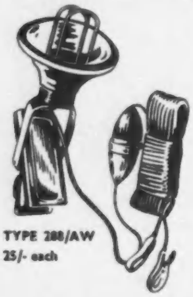
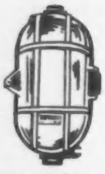

TYPE 4785/AW
14/8 each

TYPE 705/AW
8/11 each


TYPE 904/AW
18/6 each


TYPE 288/AW
25/- each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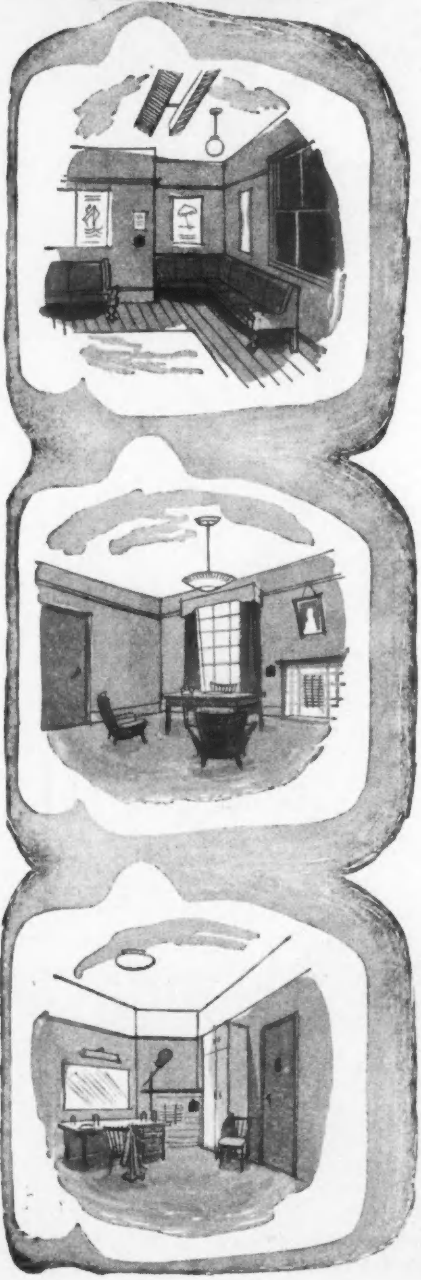
TO SWITCH ON FOR 15 MINUTES

Press button way to FUEL ECONOMY



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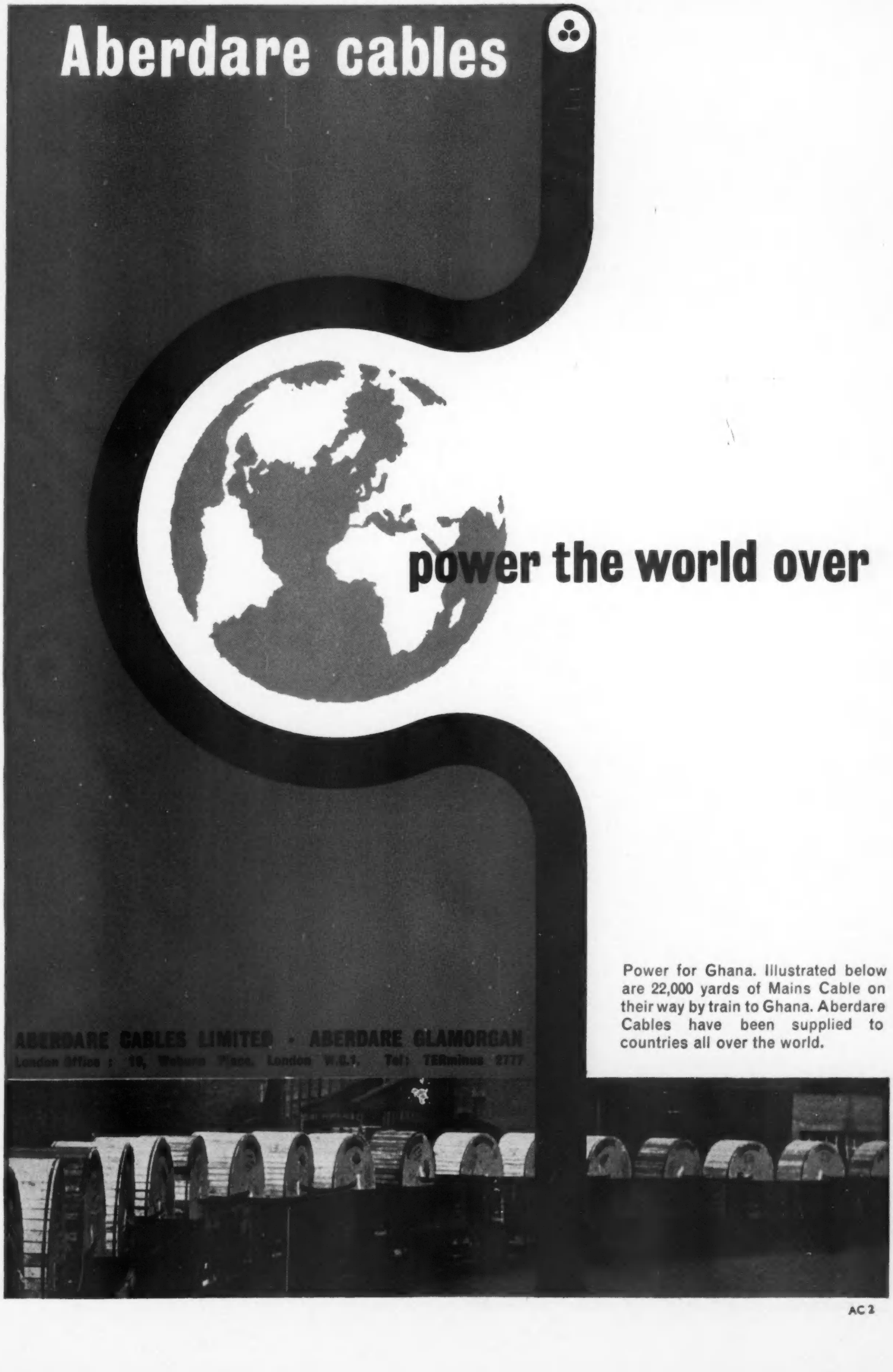

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